THE STATE OF

CANADA'S FORESTS

1999 2000

Forests in the NEW MILLENNIUM

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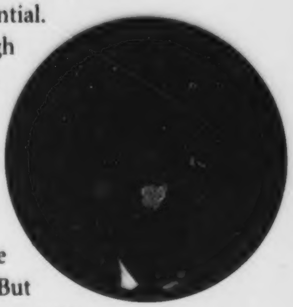
Advancing into the **NEW MILLENNIUM**

I am pleased to present to Parliament the 10th annual report on the state of Canada's forests. Featuring the most current information on this important resource, the report is both an in-depth examination of domestic and international issues affecting Canada's forests and an outline of the work that lies ahead.

Looking back from the vantage point of the new millennium, we can see how eventful the last years of the 20th century were for the Canadian forest sector. Major changes to the corporate structures of forest industries continued. Progress toward an international forest convention has been substantial. We reaffirmed our commitments to the sustainability of Canada's forest resources through both the new National Forest Strategy 1998-2003 and enhanced research and development. We have continued engaging unprecedented numbers of Canadians in discussions on sustainable forest management options. Underlying all of these activities is our understanding of how important forests are to our economy, our communities, our international trading success, and our high quality of life.



Canada is a recognized world leader in forest management and in developing innovative and practical approaches to issues the forest sector faces, such as sustainable resource use. But to remain at the forefront, we must be proactive in addressing new global realities such as stronger competition, increasing self-sufficiency among traditional trading partners, a growing world demand for forest products and increasing desire for "certified" products from sustainably managed forests. Domestically, our own commitments to manage more forests for multiple activities, such as recreation and tourism, as well as commercial uses, and a deeper understanding of the role of forests in addressing climate change will impact forest management.

Clearly, we will be facing a number of formidable challenges. I am confident that the forest sector will meet these challenges and emerge with renewed strength as a global leader and innovator. I am equally certain that the Canadian public will continue to actively participate in formulating the national policies and programs that will guide the forest sector in the new millennium.

Canadian forests will continue to have an invaluable role to play in our economic, social and environmental well-being in the 21st century. Our responsibility is to ensure that the forests remain vital and healthy so that future generations of Canadians can enjoy their benefits as we have. We cannot underestimate the importance of the decisions and actions we take today to protect this valuable resource.

The sustainability of our forests will be the key to our future success—meeting our environmental goals and ensuring the stability of communities that are economically reliant on forests while strengthening Canada's position as a powerful global trader of forest products. With our proven track record of innovation and scientific and technological ingenuity, we can meet the environmental, economic and recreational demands on our forests and, in the new millennium, lead the world as a living model of sustainable development.

Ralph Goodale
Minister of Natural Resources Canada

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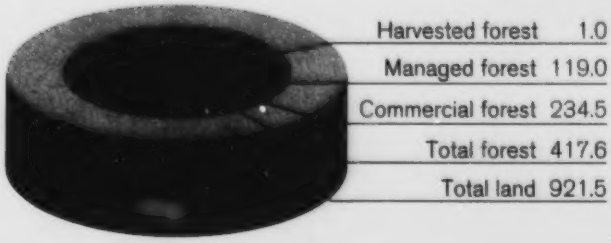
UP Front

AN OVERVIEW OF Canada's Forests

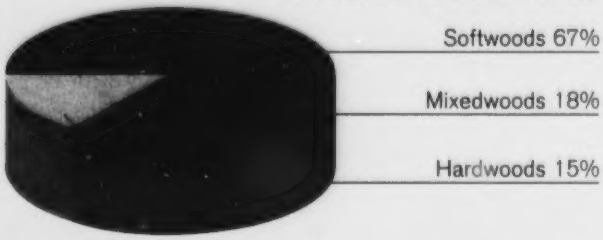
Canada's forests are the product of millennia of evolution—ecosystems of diverse complexes of plants, animals, soil, water and air. While they host the same basic life forms as forests throughout the world, Canada's forests bring together species and ecosystems distinct to our country. The life these forests support has an intrinsic value that underpins its social, cultural and economic importance.

With 10% of the world's temperate and boreal forests (an estimated 30% of the world's boreal forest), Canada is one of the few developed nations still richly endowed with large areas of natural forest. The total area of Canada is 927 million hectares, of which 921.5 million hectares is land. About half of the land mass (417.6 million hectares) is covered by forest and of this, approximately 57% (234.5 million hectares) is considered commercial forest, capable of producing timber along with a variety of other benefits, including maple products, Christmas trees and specialty craft products. Not all of this commercial forest, however, is currently accessible and managed for timber production. Of the total Canadian land area south of the northern tree line (approximately 45° latitude), well over 80 percent is forested.

CANADA'S FORESTS
million hectares



CANADA'S FOREST TYPES



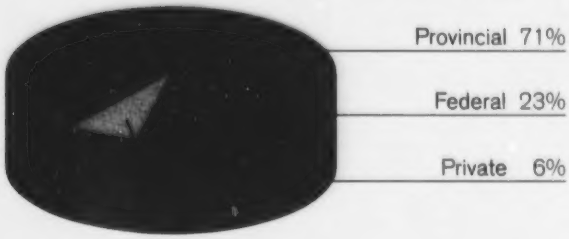
The fifteen terrestrial ecozones of Canada (based largely on climate and landform variations) have been broken down into 194 different ecoregions, which in turn have been subdivided into 1 020 ecodistricts. Eleven of the ecozones have 15% or more forest cover, with distinct mixes and numbers of species.

Forests are home to roughly two thirds of the 140 000 species of plants, animals and micro-organisms (excluding viruses) estimated to occur in Canada, only half of which have been described by taxonomists. There are approximately 180 indigenous tree species in Canada, of which 100 can be found in the Mixedwood Plains ecozone.

The average age of Canada's forests increases from east to west, reflecting differences in disturbance frequencies (fire, insect outbreaks, timber harvesting) and natural variations in species longevity. Tree species living past 160 years are common only in the west and, as a result of natural forest succession, there is a general shift from hardwood to softwood dominance with increasing age of forest stands.

Under the Canadian Constitution, the provinces have responsibility for forest management. Most of Canada's forests (94%) are publicly owned; provincial governments are responsible for managing 71% and the federal and territorial governments manage 23%. The remaining 6% are the private property of more than 425 000 landowners, including individuals, families, corporations and communities. Fully 80% of privately owned forest land is located east of Manitoba, most of it in the Maritime provinces.

FOREST LAND OWNERSHIP



In recognition of the broad spectrum of forest users, provincial government agencies seek public views and work closely with forest industries, Aboriginal groups and environmental organizations to incorporate recreational, social, wildlife and economic values into forest management planning and decision making. Each province has its own legislation, regulations, standards and programs through which it allocates public forest harvesting rights and corresponding management responsibilities. In the Northwest Territories and the Nunavut Territory, the responsibility for resource management, including that of forests, has been transferred from the federal government to the territorial governments. A similar transfer is being negotiated with the Yukon Territory.

Reports on Canada's forests are derived from Canada's Forest Inventory 1991 (revised in 1994). The inventory is a spatially referenced database containing the best information available in 1991. Forest management agencies have recently begun to broaden the scope of forest inventories to encompass non-timber values.

Annually, Canada harvests roughly 0.4% of its productive forest area, an equivalent of approximately 73% of the annual allowable cut *(see page 22)*, while fire or insect outbreaks annually affect approximately 0.5% of our forests. As a result of these major disturbances, most of Canada's forests grow in even-aged stands.

Some of Canada's forests are protected from harvesting by legislation and policies, for example, forests located on sensitive sites, such as those close to streams or on steep slopes. Other forests are protected by legislation as part of Canada's commitment to preserve a network of areas that are representative of our land and fresh water. In 1995, approximately 7.6% (roughly 32 million hectares) of Canada's forest land was protected by legislation, in addition to the forests protected by provincial policies and operational guidelines. Since that time, many provinces have increased their number of protected areas. These additions have yet to be integrated into national statistical databases.

YEAR IN REVIEW: 1999-2000

he past year was one of continued progress for Canada's forest sector. The sustainable management of our forests continued to gain both respect and momentum as an issue for all stakeholders. There was marked progress toward our national goal of a representative network of protected areas, including those representative of our forest regions. Governments, industry, environmentalists, Aboriginal peoples and the general public have all participated in bringing this common goal closer to reality. For forest-related industries it was a year of accelerated consolidation—furthering the trend toward fewer and fewer but much larger organizations. The pulp and paper industry experienced record exports this year—an improvement experts confidently attribute to economic recovery in many of the Pacific Rim countries. Also, during the last reporting period, there has been tremendous evidence of the integration of e-commerce into the daily business of many industries.

Having weathered a decade of challenge, Canada's forest sector is now looking to the future with renewed optimism. Governments and consumers, as well as the Canadian public as a whole, are clearly demonstrating their resolve to ensure the sustainability of Earth's natural resources.

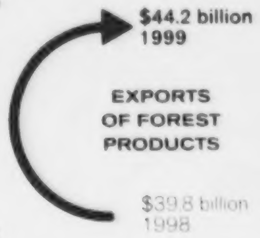
Progress toward sustained forests

In August 1999 **Prince Edward Island** announced its Forest Action Plan as a commitment to the future of that province's forests and forest industry. The eleven point plan includes an annual "State of the Forest" report on harvesting, management and other trends. The province also began preparation this year for a comprehensive land use inventory that will be the first provincial forest inventory conducted using Canada's National Forest Inventory methodology. It will be plot and photo based, and will provide benchmark data for a wide variety of natural and human resources as well as providing planners with accurate and up-to-date information on, for example, forest management planning, agricultural land use, urban/rural interface, and transportation planning. Geographic Information System data will be instantly available to resource users and managers, the public, and others through computer and Internet technology.

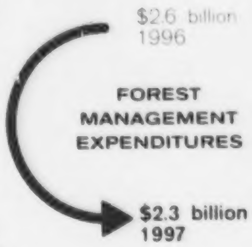
In addition the Prince Edward Island department of Agriculture and Forestry will be increasing the level of reforestation from 2.7 to 3 million seedlings in the year 2000 and will be implementing a forest education program for woodlot owners.

In September 1999, the **Canadian Model Forest Network** held its first ever partnership meeting in Halifax, Nova Scotia. The agenda focused on successes including local level indicators of sustainable forest management (SFM), community capacity building for SFM, and the importance of partnerships to SFM. The meeting was designed to provide model forest partner organizations with an opportunity to learn more about model forest activities being conducted across the Network. There are 11 model forests located across Canada.

In April 2000 the Government of **Nova Scotia** proclaimed changes to its Forests Act and approved their Forest Sustainability Regulations. The department of Natural Resources recent analysis of the province's wood supply shows that the current level of harvesting on small private woodlots is not sustainable. Therefore under the new regulations all registered buyers of more than 5 000 cubic metres of primary forest products a year will have to submit an annual Wood Acquisition Plan and choose between implementing a silviculture program or contributing to the Sustainable Forestry Fund.



The Nova Scotia Government is also currently working on Wildlife Habitat Management Regulations and a Code of Forest Practice for Crown lands that will be completed later in 2000.



The document, *A Vision for New Brunswick Forests…Goals and Objectives for Crown Land Management*, was submitted to the **New Brunswick** provincial government in December 1999, and is now available to the public. The vision document specifically establishes standards for maintaining vegetation communities within each of New Brunswick's ecoregions and dictates the use of uneven-age management techniques in tolerant hardwood stands. The document defines New Brunswick's approach to forest management on Crown lands, setting policy goals under six headings: Public Values, Forest Ecosystems, Timber, Wildlife Habitat, Water and

Recreation, and Aesthetics. It also describes strategies and actions that will be followed to pursue the policy goals.

In 1999, the **Quebec** Department of Natural Resources continued work on updating the provincial forest legislation. A Bill to amend the Forest Act (Bill 136) was tabled in the National Assembly in May 2000.

A film called **L'Erreur boreale**, by Quebec songwriter and poet, Richard Desjardins was shown across Quebec in February and March of 1999. While being described by the author as his personal viewpoint, the film garnered much reaction in Quebec.

The **Ontario** Government recently completed a comprehensive land use planning process and in July 1999 released its land use strategy entitled "Ontario's Living Legacy". This strategy was the product of a public consultation process, known as Lands for Life, which took place during 1997 and 1998. Ontario's Living Legacy adds 2.4 million hectares of new provincial parks and conservation reserves to the province's system of protected areas.

The Ontario Forest Accord is a series of 31 commitments agreed to by members of Ontario's forest industry, the environmental community and the Ontario Ministry of Natural Resources. Together, the land use strategy and the forest accord provide a framework for future cooperation and will outline the direction for such areas as forest science, policy and timber licensing.

In January 2000 the Ontario Government announced a project to establish the Great Lakes Heritage Coast as part of the Living Legacy strategy. The Great Lakes Heritage Coast includes all the Ontario coastline of Lake Superior, the north shore of the St. Mary's River and the coast of Lake Huron to eastern Georgian Bay. The coastline runs along 2 900 kilometres of shoreline and covers 1.1 million hectares of coastline and inland areas.

In its budget announcement at the end of March this year, the **Saskatchewan** Government announced an additional $3.8 million in programs to support sustainable forest management, including forest renewal, regeneration surveys, land use planning with public consultation, and Dutch elm disease management. The provincial government is also investing an initial $1 million to establish a forestry training program.

New legislation introduced last year by the **British Columbia** Government gives the Forest Land Commission the power to regulate forest practices on private land in the forest land reserve and privately-managed forest land in the agricultural land reserve. The Commission will monitor landowners' performance to make sure standards for logging on private land are met and will be able to order remedial action or impose penalties up to $1 million for non-compliance. This new legislation is the final step in a process that included a Memorandum of Understanding (MOU) signed in January outlining the new model for managing nearly one million hectares, about half of British Columbia's privately owned forest lands.

British Columbia announced early in 2000 that the proportion of clearcut logging on Crown land will be reduced from the current level of 70 percent to 40 percent within five years in the Vancouver Forest Region. Through its Small Business Forest Enterprise Program, the province grants licences to small businesses to harvest timber. Under this program 1.9 million cubic metres of timber are harvested each year in the Vancouver Forest Region which includes most of the British Columbia coast. From now on the

FOREST MANAGEMENT CERTIFICATION IN CANADA

STATUS AS OF MAY 2000

As of May 31, 2000 there were more than 16 million hectares of Canadian forest land certified under one of the three systems used in Canada: CSA, ISO or FSC *(see pages 41-42)*. Each of these systems uses third party audits to verify compliance with its standard.

Company	Location of certified lands	Certification	Area (ha)
Abitibi-Consolidated Inc.	Newfoundland woodlands	ISO* December 1999	1 864 000
		ISO May 2000	1.1 million
Canfor Corp.	All British Columbia and Alberta timberlands	ISO November 1999	3.0 million
Interfor	All British Columbia coastal forestry and logging operations	ISO December 1999	2.9 million
J. D. Irving Ltd.	Black Brook, New Brunswick	ISO March 1999 FSC** October 1998	191 000
	Nova Scotia Woodlands	ISO January 2000	140 000
Spruce Falls Inc. (a Tembec company)	Spruce Falls woodlands operations on the Gordon Cosens Forest, Ontario	ISO June 1999	1.0 million
Stora Enso Port Hawkesbury	Port Hawkesbury's woodlands, Nova Scotia	ISO December 1998	630 000
TimberWest Forest Corp.	All five divisions in British Columbia	ISO November 1999	600 000
Weldwood of Canada Ltd.	100 Mile House woodlands, British Columbia	ISO April 1999 CSA*** December 1999	250 000
	Hinton Forest Resource, Alberta	ISO March 2000	1.0 million
Western Forest Products Ltd.	Coastal operations, British Columbia	ISO April 2000	885 000
Weyerhaeuser Ltd.	British Columbia Coastal Group (North Island Division), British Columbia	ISO May 1999 CSA May 1999	230 000
	All 6 British Columbia interior units, British Columbia	ISO March 1999	1.25 million
	Alberta woodlands	ISO May 2000	1.35 million
Miscellaneous	Five smaller areas of forest lands across Canada	FSC	21 000

*ISO 14001 on forestry operations

**Forestry Stewardship Council

***CAN/CSA Z809-96, Canada's National Sustainable Forest Management system standard

Sources: Canadian Sustainable Forestry Certification Coalition and Forestry Stewardship Council International Website (www.fscoax.org)

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province will require licensees to increase their use of alternate logging methods and reduce clearcutting when harvesting under this program. The Small Business Forest Enterprise program accounts for 9 percent of logging in the Vancouver Forest Region.

The British Columbia Government released a report in April 2000 calling for changes to existing provincial forest policy. Work began on the report last July and included consultation with stakeholder groups, community workshops, public forums and more than 100 formal submissions. Entitled, *Shaping our Future*, the report contains six key recommendations to make the British Columbia forest industry more innovative and encourage sustainable management and more community and First Nations' participation through a new form of tenure called Forest Stewardship Agreements.

The final phase of the **Northwest Territories** forest tree nursery pilot project began in the spring of 2000 as approximately 30 000 locally grown white spruce seedlings were successfully planted in the Northwest Territories. The project is currently under review to determine the feasibility of a larger scale tree nursery operation in the future. Development of a northern tree nursery industry began in March 1999, with the launch of the pilot project to produce 50 000 white spruce seedlings for reforestation in the Northwest Territories.

In September 1999, new guidelines for forest planning and harvesting of timber were developed by the government of the Northwest Territories. These guidelines will assist both the forest industry and the territorial government to ensure that sustainable forest management practices are met in forest operations.

In January 2000, the Department of Resources, Wildlife and Economic Development of the Northwest Territories initiated development of a Forest Management Policy. The process started by consulting Aboriginal groups, environmental groups and regional organizations in order to develop discussion papers on future policy.

The World Resources Institute's **Global Forest Watch (GFW)** Program released its first three reports, on Canada, Cameroon and Gabon, in February 2000. Global Forest Watch, an international network of organizations, monitors and

REPORT OF THE SENATE SUB-COMMITTEE ON THE BOREAL FOREST

The final report of the Senate Sub-Committee on the Boreal Forest, Competing Realities: The Boreal Forest at Risk was released on June 29, 1999. The Sub-committee of the Senate Agriculture and Forestry Committee looked at Canada's progress in achieving the national goals of sustainable forest management and the protection of biodiversity.

According to the report, Canadians must find better ways to manage the boreal forest to meet the competing realities of preserving the resource, maintaining the lifestyle and values of boreal communities, extracting economic wealth and preserving ecological values. Portions of Canada's remaining undisturbed boreal forest and its areas of old growth are now at risk from both climate change and over cutting. The committee concluded that the demands being placed on Canada's forests can no longer be met under the current system of management.

The Subcommittee recommends that the boreal forest be divided into three categories. One category of up to 20% would be intensively managed for timber production; a second category of roughly 60% would be reserved for multiple-use that would include some less intensive timber production; and the third category of up to 20% would be protected.

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GFW's report on Canada, *Canada's Forests at a Crossroads: An Assessment in the Year 2000,* provides a look at development within Canada's forests. The report, which uses provincial and national level data, provides a GFW assessment of Canada's forests from the biodiversity and timber production perspectives. The report concludes that legislation and policies are increasingly focused on sustainable forest management yet harvesting rates appear unsustainable over the long term. The full report can be found on the Internet (http://www.globalforestwatch.org).

More Protected Areas Across the Nation

The **Newfoundland and Labrador** Committee of Ministers and Members of the House of Assembly on the Use of Outdoor Resources released its final report in July 1999, *Protecting the Legacy: Report of the Committee on the Use of Outdoor Resources.* It includes a Statement of Principles, a Declaration of Rights of Newfoundlanders and Labradorians to the use of the outdoors, a detailed statement of policy and 24 recommendations.

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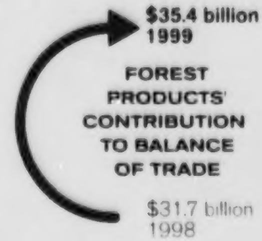
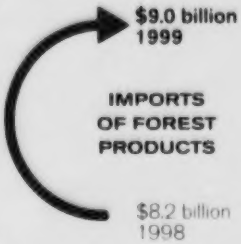
In **New Brunswick**, a committee of stakeholders has been established to develop a plan to implement the Protected Areas Network. In 1998 the Protected Areas Strategy document recommended that a comprehensive network of protected areas be established to protect one large area representing each of the province's seven ecoregions. This committee is reviewing the recommendations that came out of recent public consultations, and expected to submit its plan of action to the Minister of Natural Resources and Energy in June 2000.



In April 2000 **Manitoba** announced the expansion of its Protected Areas Initiative to include three new park reserves and protection for an additional 21 Wildlife Management Areas (WMAs). Regulations under the Provincial Parks Act will be amended to designate over 200 000 hectares as park reserves at Birch Island, Fisher Bay and Hudwin Lake in the central and northern areas of the province. Under the Provincial Parks Act, the protection status will prohibit logging, mining and the development of oil, natural gas and hydro-electric power. The First Nations and the Government of Manitoba Memorandum of Understanding (MOU) on protected areas has been extended for three years to March 2003 in



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On June 10, 1999, the House of Commons Standing Committee on Natural Resources and Government Operations tabled an interim report: *Forest Management Practices in Canada as an International Trade Issue*. The interim report contains two recommendations, namely:

- **The integration of the various sustainable forest management certification standards; and**
- **The extension of the CCFM International Forestry Partnerships Program. (The final report of the Committee is due out later this year.)**

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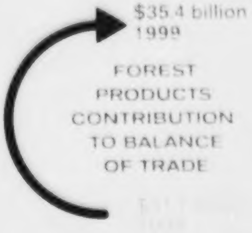

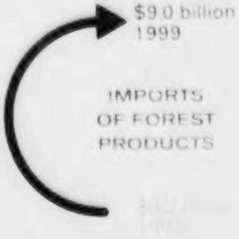

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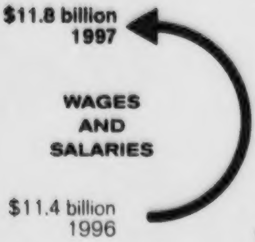
In 1999, **Alberta** designated nine new sites and an expansion under the Special Places program, contributing over 208 000 hectares to the province's network of protected areas. These sites include Grizzly Ridge Wildland Park, Sundance Provincial Park, Big Lake Conservation Natural Area, Hay Zama Lakes Wildland Park, Bob Creek Wildland Park, Black Creek Heritage Rangeland, Bow Valley Provincial Park expansion and the recently announced Beaverhill Lake Heritage Rangeland, Chinchaga Wildland Park and Twin River Heritage Rangeland. The Special Places program aims to complete a network of protected areas by the end of 2000. So far, sixty sites have been designated adding more than 760 000 hectares to Alberta's protected areas network, almost doubling protected Alberta land since the program began in 1995.



More than 245 000 hectares of forested land became part of Saskatchewan's Representative Areas Network (RAN), with the designation of the Wapawekka Hills and Seager Wheeler Lake Representative Area Ecological Reserves. A representative area is a sample of a particular landscape that has been set aside to preserve important natural or cultural features. The RAN now contains more than 4.5 million hectares of ecologically important lands that will aid in the conservation of provincial biodiversity.

In the fall of 1999, three national parks were formally established in **Nunavut** with the signing of the Inuit Impact and Benefit Agreement. This agreement ensures protection of the land and economic benefits for the people and is an integral part of the Nunavut Land Claims Agreement.

In September 1999, the **Northwest Territories** cabinet approved a Protected Areas Strategy (PAS). The strategy, *Wild Spaces, Heritage Places*, provides a means to identify, establish and protect special natural and cultural areas in the Northwest Territories. It represents a consensus among members of the PAS Advisory Committee, which included Aboriginal organizations, industry, environmental groups and government.

Conserving Ecological Integrity

The panel on the Ecological Integrity of Canada's National Parks, made up of environmentalists, academics and scientists, was struck in 1998 to examine the environmental health of our national parks and Canada's approach to maintaining the parks' ecological integrity, and to recommend improvements. The 11-member panel released its report, *Unimpaired for Future Generations*, in March 2000. The report says the federal government must renew its commitment to protect the ecological integrity of Canada's 39 national parks. The National Parks Act entrenches ecological integrity as the first priority of national parks management. A 1997 Parks Canada study found that all but one national park faced significant threats to their ecological integrity. The Panel's report contains a detailed series of recommendations to renew Parks Canada's commitment to protect the ecological integrity of the parks. The report and background information is available on the Internet (http://www.ecolog.org).

During the last year two additional sites in Canada were designated "**world biosphere reserves**" by the United Nations. Biosphere reserves are areas of terrestrial or coastal ecosystems which are internationally recognized within the UNESCO Man and the Biosphere Program for promoting and demonstrating a balanced relationship between people and nature.

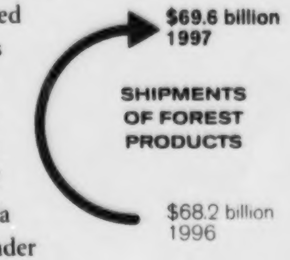
In February 2000 **Saskatchewan** had its first world biosphere reserve designated by the UNESCO at Redberry Lake. Redberry Lake is a 6 000 hectare lake near Hafford in the heart of Saskatchewan's Aspen Parkland belt. Clayoquot Sound on Vancouver Island's west coast in **British Columbia** was the second site designated as a world biosphere reserve. The nomination was a cooperative effort of First Nations, local, federal and provincial governments. The Clayoquot Biosphere Reserve is situated on the central western region of Vancouver Island and covers an area of about 3 500 square kilometres.

Forty-three individuals and organizations from across Canada were presented with forest stewardship recognition awards from **Wildlife Habitat Canada** in Fredericton, New Brunswick, in May of this year. The Forest Stewardship Recognition Program (FSRP) was launched in 1998 as a partnership between conservation groups, governments and industry to honour innovation in forest stewardship and biodiversity conservation.

The Government of the **Northwest Territories** began widespread consultation in December 1999 toward drafting a new wildlife Act and new species at risk legislation. The new wildlife Act will regulate wildlife management and harvesting activities in the Northwest Territories. Consultations will focus on identifying issues to be covered in the new Act. The new species at risk legislation will govern the protection, conservation and management of species in the Northwest Territories which may be endangered or considered threatened with extinction. Consultations will focus on a variety of options to best achieve protection for these species and will include input from Aboriginal organizations, environmental groups, industry and the public.

The Ravages of Nature

In 1999, there were 7 591 **forest fires** across the country, that burned a total of 1 705 645 hectares as of the end of December. However, there were 15 percent fewer fires than usual for the season as a whole and compared to the 10-year average, a decrease of almost half the number of hectares burned. Only Alberta and Ontario experienced more area burned than normal; all other areas reported normal to well-below normal occurrences of forest fires. The Northwest Territories and Ontario accounted for half of the total area burned in Canada in 1999, with most of the remainder coming from other western provinces, territories and National Parks.



The 2000 forest fire season got off to an early start in many places across the country due to less snowfall than usual, causing drought conditions.

In May 2000, it was reported that the **Brown Spruce Longhorn Beetle**, native to central Europe and Asia, had taken hold in a park in Halifax, Nova Scotia. It is the first recorded sighting of the beetle in North America. Experts say the eating habits of the beetle appear to have changed since landing on Canadian soil. In its home environment the beetle eats only dead and dying trees but here it is feeding on living Red Spruce trees. Red Spruce trees are native only to North America.

Dutch elm disease is again spreading fast across Eastern Ontario. Experts suggest that this is likely a result of the 1998 ice storm, as beetles that carry the disease have moved into breaks in branches and are spreading the infection.

The legacy of the **ice storm** of 1998 is still being felt in Quebec and Ontario. Both provinces signed agreements with the federal government during the year to increase financial assistance to woodlot owners affected by the storm. Eligible owners will use this money to return their woodlots to a productive state. In total, almost 37 000 woodlot owners in Ontario and Quebec will be eligible to receive disaster assistance.

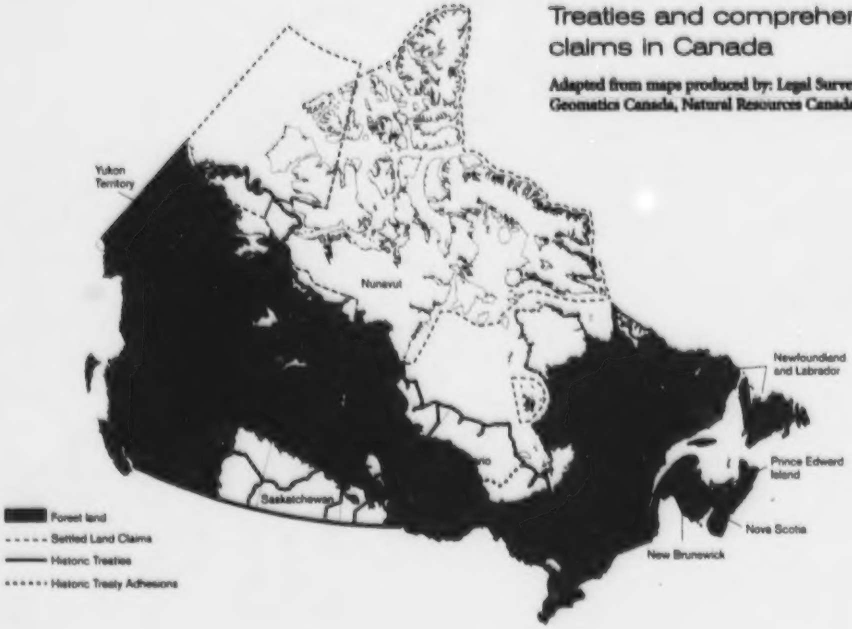
Addressing Matters of Climate Change

An additional $210 million was allocated through the 2000 federal budget, to the renewal of **Canada's Climate Change Action Fund** (CCAF) and to various energy efficiency and renewable energy programs. The CCAF was originally established in the 1998-99 federal budget. Specifically the fund supports projects that either increase the public's awareness of climate change or promote action by Canadians to reduce greenhouse gas emissions.

In February 2000, the **Pulp and Paper Research Institute of Canada** (Paprican) and Technology Partnerships Canada (TPC) embarked on Phase II of a TPC program that began in 1996 to develop environmental technologies for the pulp and paper industry. Phase I work successfully developed cost-effective processes and technologies with potential to reduce greenhouse gases. Paprican is now developing more than 30 different environmental technologies related to pulp and paper production. If Canadian mills successfully implement these technologies, Paprican estimates that the resulting decline in greenhouse gases could represent as much as five per cent of Canada's overall commitment to emissions reduction.

The Role of Boreal Forests and Forestry in the Global Carbon Budget was the title and the theme of an international science conference held in Edmonton, Alberta, in May 2000. The conference provided a forum to discuss the storing of carbon by forests and the impacts of, and adaptation to, climate change in the circumpolar boreal region.

This theme will be further explored later in 2000 when the **Conference of the Parties** (COP) takes place in the Hague. The 6th Conference of the Parties (COP6) to the United Nations



Treaties and comprehensive land claims in Canada

Adapted from maps produced by: Legal Surveys Division, Geomatics Canada, Natural Resources Canada.

Framework Convention on Climate Change will continue negotiating the Kyoto Protocol with sinks, or the carbon storing of forests, as one of the major issues. More information can be found on the Internet (http://www.UNFCCC.DE).

In November 1999, the **Saskatchewan** Government agreed to provide additional funding for reforestation as a result of an agreement on carbon sequestration between the Province and SaskPower. Under the terms of the agreement the utility will pay the Province to plant seedlings and to establish Forest Carbon Reserves—areas to be left unharvested. In return, SaskPower receives credit for the carbon held by these forests which can be counted against the company's overall emissions total. Nearly 5 million trees will be planted over the next four years under the agreement.

Aboriginal Partnerships in Forestry

The various parties involved in claims to lands and resources are demonstrating an increased willingness to negotiate leading to more and more resolutions occurring outside the court system. **Nova Scotia**, for example, is currently negotiating timber harvesting agreements with First Nations in that province; while **Quebec** has concluded several negotiations in recent years with the Micmac of Restigouche, the Montagnais on the North shore, and in June of 1999, with the Algonquin First Nations of the Abitibi-Temiscamingue region. Also in 1998-1999 Quebec concluded a framework and sectoral agreements, including forestry, with nine of the eleven Aboriginal nations in the province; and created, through reallocations, a $125 million Aboriginal economic and community development fund. In **British Columbia**, the Nisga'a

Final Agreement is awaiting enabling federal legislation while self-government agreements have been concluded with 8 of 14 **Yukon** First Nations.

Recent court rulings have clarified some First Nations' claims to land and resources, including forest resources, while explicitly recommending negotiation over litigation.

Joint ventures between forest industry companies and Aboriginals across Canada are also resulting in more negotiated resolutions. Recent examples include Weyerhaeuser and three Cree nations sawmills in Wapawekka, Saskatchewan; MacMillan Bloedel, as it then was, and Nuu-Chah-Nulth joint venture in Clayoquot Sound, British Columbia, operating as Iisaak Forest Products; Domtar and the Crees sawmill in Waswanipi, Quebec; and Donohue and the Atikamekw sawmill in Obedjiwan, also in Quebec.

In **Quebec**, the James Bay Cree filed a suit against the governments of Canada and Quebec and 27 wood and paper companies to curb timber harvesting in the territory covered by the 1975 James Bay and Northern Quebec Agreement. The Quebec Superior Court ruled Quebec's forest legislation to be in conflict with rights defined by the Agreement. That ruling directed Quebec to modify its legislation, by July 2000, to meet the requirements for environmental assessment of forest management operations, prescribed by the Agreement. However, in January 2000, the Quebec Court of Appeal agreed to hear an appeal, automatically staying the earlier December 1999 decision, pending its ruling.

The Industry

Figures released for 1999 indicate that Canada's **pulp and paper industry** sales ended the decade on a much improved note. Industry profits doubled to $600 million, providing renewed optimism for the coming year. The industry shipped a record 31 million tonnes of pulp and paper to world customers, operating rates (i.e., capacity utilization) reached 94% and pricing strengthened in all categories.

The **Quebec** Department of Natural Resources announced its new forestry strategy in March 2000. This strategy describes the challenges facing the forest products industry at the dawn of the 21st century, and the resources available to forest products companies to promote the development of a world class industry that is environmentally sustainable, innovative and focused on value-added production.

E-commerce in the Forest Sector

This year there was a noticeable move to **e-commerce** or forest.com services. Forest industry companies are beginning to use the Internet more and more as a place to do business. Forestry is a relative newcomer to the Internet for business-to-business commerce—the oldest forestry e-commerce sites are little more than a year old. Already, though, forestry-related businesses are using web pages to advertise their businesses, keep clients informed about products, services and developments, and even to answer their questions on line. Companies are rapidly discovering that they can sell seven days a week, 24 hours per day around the world via the Internet. Both pulp and paper and timber companies are already online. Almost 30 companies were recently listed at an Industry Canada e-commerce website, with the number growing daily.

The 5 year Canada-United States Softwood Lumber Agreement will expire on March 31, 2001. Under the terms of the Agreement, each year, 14.7 billion board feet of softwood lumber from the four main producing provinces—British Columbia, Alberta, Ontario and Quebec—are allowed into the United States fee free. Quantities over this limit are subject to export fees. Consultations with industry, the provinces and other stakeholders are underway to determine what course of action Canada should take when the Agreement expires. This is a key issue for lumber exporters, as 88% of Canada's softwood lumber exports go to the United States.

Research and Development

Canada's Budget 2000 included $15 million for Canada's three **national forestry research institutes**—Forintek, FERIC (Forest Engineering Research Institute of Canada) and Paprican (Pulp and Paper Research Institute of Canada). These institutes are considered to be a vital part of Canada's research and development infrastructure. Their research is aimed at helping Canada's forest industry improve productivity and innovation, and providing technological solutions that are considered crucial to an ecologically sustainable and economically viable forest industry.

Canada and the World

In June 1999, the United Nations Food and Agriculture Organization (FAO) announced that Canada will host the **12th World Forestry Congress** to be held in Quebec City in 2003. This international event is held once every six years. More than 5 000 participants, including scientists, policy makers and other delegates from the forestry industry are expected to attend the event and will discuss an array of forestry issues.

Early this year nineteen forest sector representatives joined a **federal government mission to China and South Korea** to encourage trade and investment. With China's economy expanding due to economic reform and market liberalization, and South Korea's economy in recovery, this was seen as an opportunity to strengthen Canada's trade relations with these countries.

This mission included more than 70 representatives from companies from the forest, energy, earth sciences and minerals and metals sectors, as well as officials from federal and provincial governments and Canada's Aboriginal communities.

Officials discussed wood housing construction technology and products, as well as other Canadian wood products. Seminars held in Beijing and Shanghai allowed Canadian companies to showcase their technology and services and meet with government and industry representatives from the Chinese forest sector. The seminar in Korea focused on building products and codes. Areas of particular interest to the Chinese include forest fire management, forest pest management and forest renewal.

CORPORATE MERGERS AND ACQUISITIONS IN THE FOREST SECTOR

1999-2000

In 1999, there was increased consolidation of the forest industry in Canada. This trend continued and accelerated into this year where there were as many mergers in the first four months as in all of 1999. One very large transaction, the acquisition of Donohue Inc. by Abitibi-Consolidated Inc. for $7.1 billion, was greater than all the acquisitions that occurred in 1999.

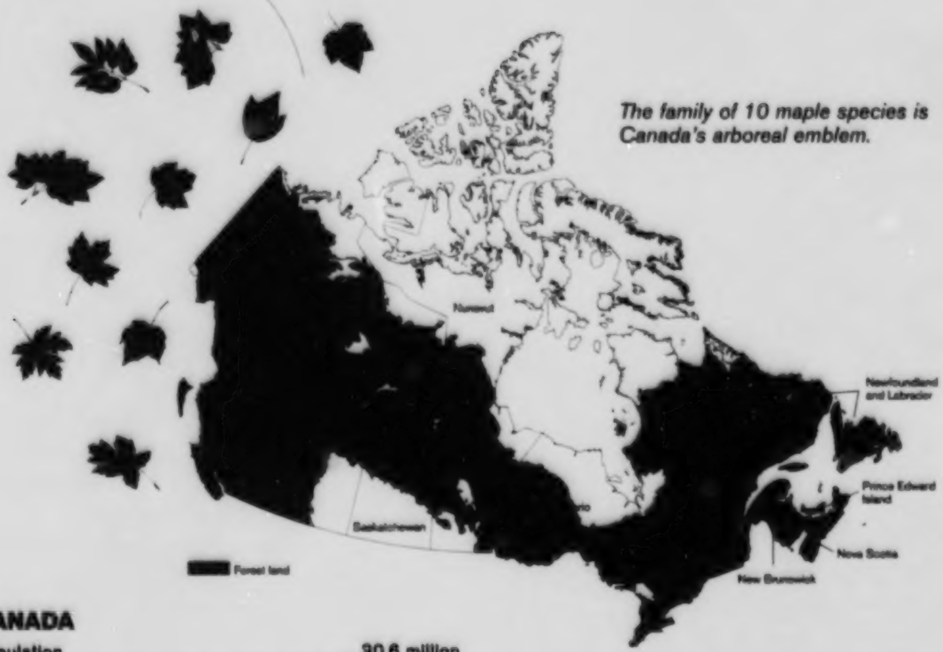
The forest sector, which is still highly fragmented, has, like other sectors of industry, moved in recent years toward consolidation and greater efficiency. Industry analysts note that there are a number of reasons why this trend toward consolidation in the Canadian forest sector is growing and is likely to continue for some time. They point to the availability of the Canadian timber supply and the weakness of the Canadian dollar which, together, make Canadian companies particularly attractive. In addition, securing a regional source of supply, at competitive prices, for global consumers is important for consolidation. Consolidation is also seen as an effective means to retire higher cost and excess capacity in the industry, in order to improve efficiency and return on capital for shareholders. Also, the cyclical nature of the forest products industry has made it particularly difficult to attract capital for modernization and expansion. Consolidation by higher-leveraged U.S. companies opens opportunities to gain access to larger pools of capital investment and financing. Finally, while the value of many Canadian forest company stocks has grown over the last year, analysts continue to see many of these as undervalued and attractive opportunities for investment.

These consolidated companies tend to take advantage of their new structure to improve their cost structure and close or modernize their inefficient or high-cost operations in order to become more competitive. Having more capital value usually attracts investors and increased product concentration tends to reduce price volatility. Industry analysts suggest that to remain competitive, companies need to become larger players in a smaller number of product lines. They also predict that the consolidation trend will continue, especially in western Canada, since consolidation started to occur more slowly to begin with in that region. Analysts further predict that, in the long run, there will be six to eight global forestry giants with many smaller, regional companies.

DATE	**COMPANIES INVOLVED**			**ACTION**	**LOCATION**		**VALUE**
Jan. 1999	Norampac Montréal, QC	➜	Metro Waste Recovery Sub of Paperboard Industries Montréal, QC	Exchange	ON.: USA:	1 recovery and processing centre 1 medium-density fibreboard plant	
	Metro Waste Recovery Montréal, QC		Norampac Montréal, QC	Exchange			Norampac gets 27.5 % of Metro Waste's Shares
	• Chatham Forest Products Ltd., NB • Stone & Webster Canada Ltd. • Temple-Inland Forest Products Ltd. Austin, Texas	➜	MacMillan Bloedel Vancouver, BC	Increase in ownership from 50% to 90% by Macmillan	NB:	1 OSB mill	$30 million
Feb. 1999	Shepherd Tissue Memphis, Tennessee	➜	Kruger Inc. Montréal, QC	Sale	USA:	1 tissue mill	Undisclosed
April 1999	Finlay Forest Industries, Inc. Vancouver, BC	➜	Donohue Inc. Montréal, QC	Sale	BC:	1 newsprint mill 2 sawmills	$80 million
May 1999	Saskfor Macmillan Saskatoon, SK	➜	Macmillan Bloedel Vancouver, BC	Buyout of outstanding 50% shares of Saskfor	SK:	1 OSB mill 1 plywood plant 1 sawmill	$80 million

June 1999	Macmillan Bloedel Vancouver, BC	→	Weyerhaeuser Tacoma, Washington	Sale	BC: 6 lumber mills NB: 1 OSB mill ON: 2 lumber mills 1 OSB mill 1 plywood mill SK: 1 lumber mill USA: 4 containerboard mills 19 containerboard converting mills 1 lumber mill 1 plywood mill	$3.6 billion
July 1999	Harmac Pacific Vancouver, BC	→	Pope and Talbot Portland, Oregon	Buyout of outstanding 43% Harmac shares	BC: 1 pulp mill	$93 million
	Evans Forest Products Golden, BC	→	Louisiana-Pacific Portland, Oregon	Sale	BC: 1 LVL mill 1 plywood cedar mill 1 red cedar mill	$133 million
August 1999	Northwood Inc. Prince George, BC	→	Canfor Inc. Vancouver, BC	Sale	BC: 1 pulp mill 4 sawmills 1 plywood mill	$635 million
	Zeidler Forest Industries Inc. Edmonton, AB	→	West Fraser Timber Co. Ltd. Vancouver, BC	Sale	AB: 1 plywood plant 1 veneer plant BC: 1 veneer plant	Undisclosed
Sept. 1999	Le Groupe Forex Montréal, QC	→	Louisiana-Pacific Corp. Portland, Oregon	Sale	QC: 3 OSB mills 2 sawmills	$760 million
	Paperboard International Montréal, QC	→	Tembec Temiscaming, QC	50% outstanding shares in Tartas mill	France: 1 pulp mill	$35 million
Nov. 1999	CSC Forest Products Ltd. UK	→	NexFor Inc. Toronto, ON	Buyout of 50% outstanding shares in CSC	UK	$120 million
Dec. 1999	• SFG Rexfor Inc. Quebec City, QC • Donohue Inc. Montréal, QC	→	Tembec Inc. Temiscaming, QC	Sale	QC: 1 pulp mill	$13.5 million
	Malette Rexfor Inc. Montréal, QC	→	Tembec Inc. Temiscaming, QC	Sale	QC: 1 fine paper mill 1 OSB mill	$53 million
	Eastern Container Massachusetts	→	Saint Laurent Paperboard Montréal, QC	Buyout of outstanding 51% shares of Eastern	USA: 3 packaging plants	Undisclosed
	Fort James Corp. Marathon, ON	→	• Tembec Inc. Temiscaming, QC • Kruger Inc. Montréal, QC	Sale	ON: 1 pulp mill	$100 million
Feb. 2000	Donohue Inc. Montréal, QC	→	Abitibi Consolidated Inc. Montréal, QC	Sale	QC: 13 sawmills 1 pulp mill 3 newsprint mills 2 cogeneration plants ON: 1 newsprint mill 1 recycling centre BC: 1 sawmill 1 newsprint mill USA: 2 newsprint mills 1 pulp mill 6 recycling centres 2 cogeneration plants	$7.1 billion
Feb. 2000	St. Laurent Paperboard Montréal, QC	→	Smurfit-Stone Chicago	Sale	QC: 2 containerboard mills 1 packaging plant 1 solid wood operations ON: 1 containerboard mill 3 packaging plants USA: 1 containerboard plant 13 packaging plants 4 solid wood operations	$2.04 billion
April 2000	Fletcher Challenge Paper New Zealand	→	Norske Skog Norway	Sale pending as of June 2000	BC: 2 newsprint mills 1 pulp mill	$3.75 billion
May 2000	Champion International Owner of Weldwood Canada	→	International Paper Purchase, NY	Sale pending as of June 2000	BC: 5 sawmills 1 specialty lumber mill 2 plywood mills 1 pulp mill AB: 2 sawmills 1 pulp mill 1 LVL mill	$U.S. 7.3 billion

PROFILES Across the Nation



The family of 10 maple species is Canada's arboreal emblem.

CANADA

Population	**30.6 million**
Total area	997.0 million ha
Land area	921.5 million ha
Forest land	417.6 million ha
National parks	24.5 million ha
Provincial parks	22.9 million ha

FOREST RESOURCE

Ownership	
Provincial	71%
Federal	23%
Private	6%
Forest type	
Softwood	67%
Mixedwood	18%
Hardwood	15%
Annual allowable cut (1998)[a]	240.9 million m^3
Harvest (volume) – industrial roundwood (1998)[b]	174.5 million m^3
Harvest (area) (1998)	1.08 million ha
Status of harvested Crown land (1998)[c]	
Stocked (84%)	13.5 million ha
Understocked (16%)	2.5 million ha
Area defoliated by insects (1998)[d]	5.1 million ha
Area burned (1999)[e]	1 705 645 ha
Full Response area burned	723 143 ha

FOREST INDUSTRY

Value of exports (1999)	$44.2 billion
Softwood lumber	29%
Other paper and paperboard	21%
Wood pulp	17%
Newsprint	15%
Waferboard	5%
Major export markets (1999)	
United States	79%
European Union	7%
Japan	7%
Others	7%
Balance of trade (1999)	$35.4 billion
Contribution to GDP (1999)	$19.4 billion
Value of shipments (1997)	$69.6 billion
Exported	56%
Sold domestically	44%
Number of establishments (1997)	12 630
Logging	8 920
Wood	3 019
Paper and allied	691
Direct jobs* (1999)	352 000
Wages and salaries (1997)	$11.8 billion
New investments (1999)	$3.6 billion

***see page 32**

a, b, c, d, e, *see page 29*

Population	541 559
Total area	40.6 million ha
Land area	37.2 million ha
Forest land	22.5 million ha
Provincial parks	439 400 ha

FOREST RESOURCE

Ownership		
Provincial*		99%
Private		1%
Forest type		
Softwood		91%
Mixedwood		8%
Hardwood		1%
Annual allowable cut (1997)[a]		2.6 million m^3
Harvest (volume) (1998)[b]		1.9 million m^3
Harvest (area) (1998)		17 408 ha
Status of harvested Crown land (1998)[c]		
Stocked	(80%)	293 000 ha
Understocked	(20%)	72 000 ha
Area defoliated by insects (1999)[d]		35 121 ha
Area burned (1998)		40 226 ha
Intensive Protection Zone burned		6 722 ha

FOREST INDUSTRY

Value of exports (1999)	$586.4 million
Newsprint	96%
Softwood lumber	4%
Major export markets (1999)	
United States	55%
European Union	23%
South and Central America	15%
Other countries	7%
Balance of trade (1999)	$571.8 million
Value of shipments (1997)	$710.0 million
Number of establishments (1997)	158
Logging	103
Wood	47
Paper and allied	8
Direct jobs (1999)	5 100
Wages and salaries (1997)	$114.0 million
New investments (1999)	not available

**Timber and property rights for 69% of the Crown land on the island of Newfoundland has been conveyed to pulp and paper companies through 99 year licences issued under the 1905 Pulp and Paper Manufacturing Act and 1935 Bowater Act. Therefore, the Province's financial and legal system treats this licensed land as private property.*

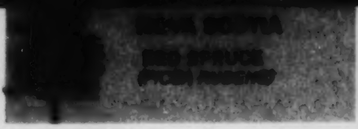
Population	138 837
Total area	0.57 million ha
Land area	0.57 million ha
Forest land	0.29 million ha
Provincial parks	1 500 ha

FOREST RESOURCE

Ownership		
Provincial		7%
Federal		1%
Private		92%
Forest type		
Softwood		35%
Mixedwood		35%
Hardwood		30%
Annual allowable cut (1999)[a]		0.5 million m^3
Harvest (volume) (1999)[b]		0.5 million m^3
Harvest (area) (1999)		5 780 ha
Status of harvested Crown land (1997)[c]		
Stocked	(72%)	24 600 ha
Understocked	(28%)	9 400 ha
Area defoliated by insects (1999)[d]		0
Area burned (1999)		77 ha
Intensive Protection Zone burned		77 ha

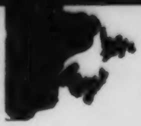
FOREST INDUSTRY

Value of exports (1999)	$22.6 million
Softwood lumber	89%
Other paper and paperboard	6%
Major export markets (1999)	
United States	99%
Other countries	1%
Balance of trade (1999)	$22.2 million
Value of shipments (1997)	$44.0 million
Number of establishments (1997)	32
Logging	17
Wood	12
Paper and allied	3
Direct jobs (1999)	700
Wages and salaries (1997)	$8.0 million
New investments (1999)	not available



NOVA SCOTIA

RED SPRUCE
(PICEA RUBENS)



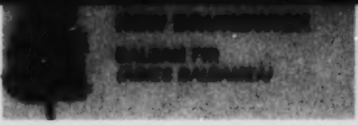
Population	942 017
Total area	5.6 million ha
Land area	5.3 million ha
Forest land	3.9 million ha
Provincial parks	21 800 ha

FOREST RESOURCE

Ownership		
Provincial		28%
Federal		3%
Private		69%
Forest type		
Softwood		45%
Mixedwood		22%
Hardwood		33%
Annual allowable cut (1998)[a]		6.7 million m^3
Harvest (volume) (1998)[b]		5.8 million m^3
Harvest (area) (1998)		54 203 ha
Status of harvested Crown land (1997)[c]		
Stocked	(96%)	173 000 ha
Understocked	(4%)	7 900 ha
Area defoliated by insects (1999)[d]		49 866 ha
Area burned (1999)		1 823 ha
Intensive Protection Zone burned		1 823 ha

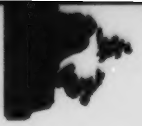
FOREST INDUSTRY

Value of exports (1999)	$959.9 million
Newsprint	31%
Wood pulp	17%
Softwood lumber	26%
Other paper and paperboard	20%
Major export markets (1999)	
United States	70%
European Union	17%
Central and South America	9%
Other countries	4%
Balance of trade (1999)	$939.2 million
Value of shipments (1997)	$1.2 billion
Number of establishments (1997)	512
Logging	418
Wood	83
Paper and allied	11
Direct jobs (1999)	10 400
Wages and salaries (1997)	$244.0 million
New investments (1999)	not available



NEW BRUNSWICK

BALSAM FIR
(ABIES BALSAMEA)



Population	756 625
Total area	7.3 million ha
Land area	7.2 million ha
Forest land	6.1 million ha
Provincial parks	24 900 ha

FOREST RESOURCE

Ownership		
Provincial		48%
Federal		1%
Private		51%
Forest type		
Softwood		47%
Mixedwood		29%
Hardwood		24%
Annual allowable cut (1998)[a]		11.0 million m^3
Harvest (volume) (1998)[b]		11.5 million m^3
Harvest (area) (1997)		112 436 ha
Status of harvested Crown land (1998)[c]		
Stocked	(96%)	510 000 ha
Understocked	(4%)	22 000 ha
Area defoliated by insects (1999)[d]		59 274 ha
Area burned (1998)		284 ha
Intensive Protection Zone burned		284 ha

FOREST INDUSTRY

Value of exports (1999)	$2.6 billion
Other paper and paperboard	28%
Softwood lumber	30%
Wood pulp	19%
Newsprint	11%
Major export markets (1999)	
United States	85%
European Union	5%
Japan	4%
Central and South America	2%
Other countries	4%
Balance of trade (1999)	$2.4 billion
Value of shipments (1997)	$3.7 billion
Number of establishments (1997)	1 015
Logging	855
Wood	139
Paper and allied	21
Direct jobs (1999)	18 700
Wages and salaries (1997)	$530.0 million
New investments (1999)	not available

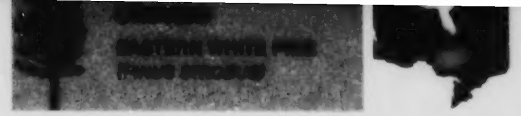
Population	7.4 million
Total area	154.1 million ha
Land area	135.7 million ha
Forest land	83.9 million ha
Provincial parks	7.1 million ha

FOREST RESOURCE

Ownership		
Provincial		89%
Private		11%
Forest type		
Softwood		58%
Mixedwood		23%
Hardwood		19%
Annual allowable cut (1998)[a]		58.0 million m^3
Harvest (volume) (1998)[b]		41.4 million m^3
Harvest (area) (1998)		398 486 ha
Status of harvested Crown land (1997)[c]		
Stocked	(92%)	4.5 million ha
Understocked	(8%)	393 000 ha
Area defoliated by insects (1999)[d]		587 530 ha
Area burned (1999)		97 747 ha
Intensive Protection Zone burned		27 807 ha

FOREST INDUSTRY

Value of exports (1999)	$11.5 billion
Newsprint	25%
Other paper and paperboard	28%
Softwood lumber	19%
Wood pulp	8%
Major export markets (1999)	
United States	87%
European Union	7%
Other countries	6%
Balance of trade (1999)	$9.9 billion
Value of shipments (1997)	$18.7 billion
Number of establishments (1997)	2 976
Logging	1 714
Wood	1 056
Paper and allied	206
Direct jobs (1999)	110 300
Wages and salaries (1997)	$3.2 billion
New investments (1999)	$1.3 billion



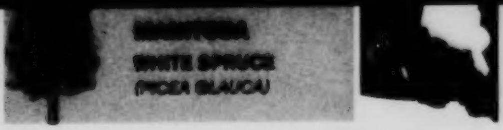
Population	11.6 million
Total area	106.9 million ha
Land area	89.1 million ha
Forest land	58.0 million ha
Provincial parks	6.3 million ha

FOREST RESOURCE

Ownership		
Provincial		88%
Federal		1%
Private		11%
Forest type		
Softwood		50%
Mixedwood		27%
Hardwood		23%
Annual allowable cut (1998)[a]		0.4 million ha
Harvest (volume) (1998)[b]		23.8 million m^3
Harvest (area) (1998)		219 730 ha
Status of harvested Crown land (1998)[c]		
Stocked	(87%)	3.7 million ha
Understocked	(13%)	543 000 ha
Area defoliated by insects (1999)[d]		4.3 million ha
Area burned (1998)		158 275 ha
Intensive Protection Zone burned		66 002 ha

FOREST INDUSTRY

Value of exports (1999)	$8.9 billion
Other paper and paperboard	37%
Newsprint	16%
Wood pulp	12%
Softwood lumber	11%
Waferboard	8%
Major export markets (1999)	
United States	97%
Other countries	3%
Balance of trade (1999)	$3.7 billion
Value of shipments (1997)	$15.5 billion
Number of establishments (1997)	2 750
Logging	1 756
Wood	680
Paper and allied	314
Direct jobs (1999)	76 500
Wages and salaries (1997)	$2.8 billion
New investments (1999)	$0.7 billion



MANITOBA

WHITE SPRUCE (PICEA GLAUCA)

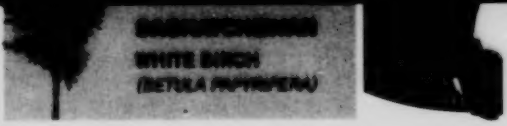
Population	1.1 million
Total area	65.0 million ha
Land area	54.8 million ha
Forest land	26.3 million ha
Provincial parks	1.5 million ha

FOREST RESOURCE

Ownership	
Provincial	94%
Federal	1%
Private	5%
Forest type	
Softwood	59%
Mixedwood	20%
Hardwood	21%
Annual allowable cut (1997)[a]	9.7 million m³
Harvest (volume) (1997)[b]	2.1 million m³
Harvest (area) (1997)	15 544 ha
Status of harvested Crown land (1998)[c]	
Stocked (94%)	263 000 ha
Understocked (6%)	16 000 ha
Area defoliated by insects (1998)[d]	181 614 ha
Area burned (1997)	41 796 ha
Intensive Protection Zone burned	11 042 ha

FOREST INDUSTRY

Value of exports (1999)	$607.4 million
Other paper and paperboard	20%
Newsprint	19%
Softwood lumber	19%
Waferboard	17%
Major export markets (1999)	
United States	95%
European Union	1%
Other countries	4%
Balance of trade (1999)	$259.3 million
Value of shipments (1997)	$918.0 million
Number of establishments (1997)	248
Logging	164
Wood	63
Paper and allied	21
Direct jobs (1999)	6 500
Wages and salaries (1997)	$189.0 million
New investments (1999)	not available



SASKATCHEWAN

WHITE BIRCH (BETULA PAPYRIFERA)

Population	1.0 million
Total area	65.2 million ha
Land area	57.1 million ha
Forest land	28.8 million ha
Provincial parks	908 000 ha

FOREST RESOURCE

Ownership	
Provincial	97%
Federal	2%
Private	1%
Forest type	
Softwood	39%
Mixedwood	25%
Hardwood	36%
Annual allowable cut (1997)[a]	7.6 million m³
Harvest (volume) (1997)[b]	4.1 million m³
Harvest (area) (1997)	17 500 ha
Status of harvested Crown land (1997)[c]	
Stocked (36%)	150 000 ha
Understocked (64%)	269 000 ha
Area defoliated by insects (1998)[d]	1 025 356 ha
Area burned (1997)	3 885 ha
Intensive Protection Zone burned	2 265 ha

FOREST INDUSTRY

Value of exports (1999)	$734.1 million
Wood pulp	37%
Other paper and paperboard	26%
Softwood lumber	29%
Waferboard	7%
Major export markets (1999)	
United States	76%
European Union	8%
Japan	3%
Central and South America	2%
Other countries	11%
Balance of trade (1999)	$654.6 million
Value of shipments (1997)	$947.0 million
Number of establishments (1997)	251
Logging	191
Wood	55
Paper and allied	5
Direct jobs (1999)	4 900
Wages and salaries (1997)	$166.0 million
New investments (1999)	not available

ALBERTA

LODGEPOLE PINE
(PINUS CONTORTA)

Population	3.0 million
Total area	66.1 million ha
Land area	64.4 million ha
Forest land	38.2 million ha
Provincial parks	1.3 million ha

FOREST RESOURCE

Ownership		
Provincial		87%
Federal		9%
Private		4%
Forest type		
Softwood		44%
Mixedwood		23%
Hardwood		33%
Annual allowable cut (1998)[a]		24.8 million m³
Harvest (volume) (1998)[b]		17.0 million m³
Harvest (area) (1998)		61 222 ha
Status of harvested Crown land (1998)[c]		
Stocked	(67%)	647 000 ha
Understocked	(33%)	325 000 ha
Area defoliated by insects (1999)[d]		774 788 ha
Area burned (1999)		122 626 ha
Intensive Protection Zone burned		122 626 ha

FOREST INDUSTRY

Value of exports (1999)	$3.0 billion
Wood pulp	43%
Softwood lumber	27%
Waferboard	15%
Newsprint	5%
Major export markets (1999)	
United States	71%
Japan	11%
European Union	6%
Other countries	12%
Balance of trade (1999)	$2.8 billion
Value of shipments (1997)	$4.4 billion
Number of establishments (1997)	548
Logging	323
Wood	198
Paper and allied	27
Direct jobs (1999)	24 300
Wages and salaries (1997)	$704.0 million
New investments (1999)	$0.2 billion

BRITISH COLUMBIA

WESTERN RED CEDAR
(THUYA PLICATA)

Population	4.0 million
Total area	94.8 million ha
Land area	93.0 million ha
Forest land	60.6 million ha
Provincial parks	8.3 million ha

FOREST RESOURCE

Ownership		
Provincial		95%
Federal		1%
Private		4%
Forest type		
Softwood		89%
Mixedwood		8%
Hardwood		3%
Annual allowable cut (1998)[a]		78.5 million m³
Harvest (volume) (1999)[b]		76.9 million m³
Harvest (area) (1998)		176 128 ha
Status of harvested Crown land (1997)[c]		
Stocked	(78%)	2.8 million ha
Understocked	(22%)	787 000 ha
Area defoliated by insects (1999)[d]		not available
Area burned (1999)		68 925 ha
Intensive Protection Zone burned		68 925 ha

FOREST INDUSTRY

Value of exports (1999)	$15.3 billion
Softwood lumber	48%
Wood pulp	22%
Other paper and paperboard	9%
Newsprint	5%
Major export markets (1999)	
United States	64%
Japan	17%
European Union	9%
Other countries	10%
Balance of trade (1999)	$14.1 billion
Value of shipments (1997)	$23.5 billion
Number of establishments (1997)	4 140
Logging	3 379
Wood	686
Paper and allied	75
Direct jobs (1999)	94 600
Wages and salaries (1997)	$3.9 billion
New investments (1999)	$0.7 billion

[illegible]

THE YUKON TERRITORY DOES NOT HAVE AN ARBOREAL EMBLEM

Population	30 343
Total area	48.3 million ha
Land area	47.9 million ha
Forest land	27.5 million ha

FOREST RESOURCE

Ownership	
Federal	100%
Forest type	
Softwood	79%
Mixedwood	19%
Hardwood	2%
Annual allowable cut (1999)[a]	343 500 m³
Harvest (volume) (1999)[b]	253 326 m³
Harvest (area) (1999)	1 034 ha
Status of harvested Crown land (1998)[c]	
Understocked (69%)	7 200 ha
Stocked (31%)	3 300 ha
Area defoliated by insects (1999)[d]	not available
Area burned (1999)	not available

FOREST INDUSTRY

Value of exports (1999)	$8.4 million
Softwood lumber	97%
Major export markets (1999)	
United States	100%
Balance of trade (1999)	$8.4 million

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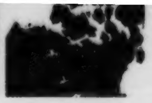
JACK PINE

(PINUS BANKSIANA)



Population	42 056
Total area	342.6 million ha
Land area	329.3 million ha
Forest land	61.4 million ha

FOREST RESOURCE

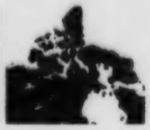
Ownership	
Federal	100%
Forest type	
Softwood	33%
Mixedwood	58%
Hardwood	9%
Annual allowable cut (1997)[a]	236 500 m³
Harvest (volume) (1996)[b]	182 900 m³
Harvest (area) (1998)	547 ha
Status of harvested Crown land (1993)[c]	
Understocked (85%)	2 600 ha
Stocked (15%)	440 ha
Area defoliated by insects (1999)[d]	487 556 ha
Area burned (1999)	549 879 ha
Intensive Protection Zone burned	549 879 ha

FOREST INDUSTRY

Value of exports (1999)	$7.1 million
Softwood lumber	94%
Major export markets (1999)	
United States	100%
Balance of trade (1999)	$7.1 million

NUNAVUT

NUNAVUT DOES NOT HAVE AN ARBOREAL EMBLEM



Population	27 340
Total area	199.4 million ha

FOREST INDUSTRY

Value of exports (1999)	$94 000
Softwood lumber	100%
Major export markets (1999)	
United States	100%

NOTES

Data Sources

The main sources for the data are Statistics Canada, Environment Canada, the Canadian Pulp and Paper Association, Natural Resources Canada–Canadian Forest Service, the National Forestry Database and the Canadian Interagency Forest Fire Centre. Most of the information for the National Forestry Database was collected by provincial and territorial natural resource ministries. At the time of publication, all data were preliminary. 1998 Values for Canada—Forest Resource (page 22) are estimates based on 1997 information, as 1998 totals were not finalized at the time of publication. As data are finalized, they will be made available on the Internet in the National Forestry Database (http://nfdp.ccfm.org).

Arboreal Emblem

An illustration of the tree species that has been designated or officially adopted as the arboreal emblem of Canada and of each province and territory is included in the profiles on the preceding pages. The Yukon Territory and Nunavut do not have arboreal emblems.

Forest Land

The data regarding Canada's forest land are based on the Canada Forest Inventory 1991 (revised 1994). The map on page 22 shows the forest land boundary.

Forest Resource

Ownership data are provided for the total forest land.

[a] Annual allowable cut: The level of harvest set by the provinces and territories for a year is called the "annual allowable cut" (AAC). AAC figures include data for both softwoods and hardwoods. The AAC figures for Newfoundland, Prince Edward Island, Nova Scotia, New Brunswick, Quebec and Manitoba include federal, provincial and private lands. Given the differences outlined below, a national AAC cannot be calculated by simply adding the provincial and territorial AACs.

- The national AAC figure that appears on page 22 was arrived at by estimating some data for private and federal lands, and converting the Ontario area figures into volume figures.
- Ontario provides figures for AAC (which it refers to as the "maximum allowable depletion") in hectares only.
- Saskatchewan, Alberta and Ontario do not include figures for private lands in their AACs.
- British Columbia does not include all private lands in its AAC.

[b] Harvesting: The national and provincial figures for harvesting volume include data for industrial roundwood only. The harvest level for fuelwood or firewood for a single province may range as high as 2.2 million m^3, and is not included in these harvest figures.

- Although the AAC for British Columbia does not include all private lands, these lands are included in the harvest figure. The yearly harvest rate for British Columbia may fluctuate, and in some cases, it may exceed the AAC. Over a five-year period, however, the harvest figure would be equal to or lower than the AAC.

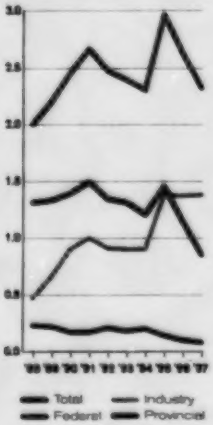
[c] Status of harvested Crown land: These data reflect the cumulative area harvested since 1975. Data for private lands are not included. The term "stocked" refers to land where the forest cover meets certain timber-production standards established by forest management agencies in each province and territory. The term "understocked" refers to harvested land that requires silviculture treatments, such as site preparation, planting, seeding or weeding, to meet established standards. This category also includes land that has not yet been surveyed. **A significant proportion of recently harvested areas will always be reported as understocked because of the time lag between harvesting and observable results of subsequent treatments.** The small percentage of the area harvested each year that is devoted to access roads is not included in these data.

[d] Insect defoliation: The data relating to insects were provided by provincial and territorial agencies, and they include moderate-to-severe defoliation only. Defoliation does not always imply mortality; for example, stands with moderate defoliation often recover and may not lose much growth. Also, defoliation is mapped on an insect-by-insect basis, and a given area may be afflicted by more than one insect at a time. This may result in double or triple counting in areas affected by more than one insect, exaggerating the extent of the total area defoliated.

[e] Canada total figure from the Canadian Interagency Forest Fire Centre. Area burned does not include areas within national parks.

FORESTRY STATISTICS: How the Picture has Changed

Forest Management Expenditures


Forest Management Expenditures ($billion)

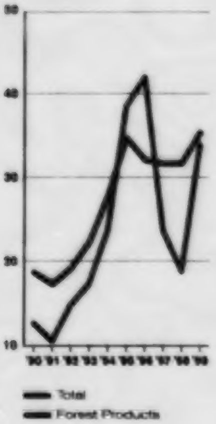
Forest management involves regenerating forest areas that have been harvested or damaged by fire or insects. Total forest management expenditures declined in 1997 from the previous year, due mainly to a significant drop in expenditures by the provinces. Federal government expenditures also declined, while expenditures by industry remained stable. In recent years, the provinces have shifted responsibility for forest management costs to industry. Between 1988 and 1997, industry expenditures nearly tripled, while provincial expenditures declined substantially in the past two years and federal expenditures dropped by two thirds. All told, forest management expenditures rose 16% over the 10-year period, an average annual growth rate of 1.5%. In the last 10 years, cumulative spending on forest management totalled $24.3 billion.

1997*	**$ BILLION**	**ANNUAL CHANGE**	
		1-year	**10-year**
Total expenditures	2.3	-11.5%	+1.5%
Industry	1.4	+0.4%	+11.5%
Provincial	0.9	-25.4%	-4.1%
Federal	0.1	-16.8%	-9.4%

**more recent data were not available at the time of printing*

Sources: Canadian Pulp & Paper Association; National Forestry Database

Balance of Trade


Balance of Trade ($billion)

In 1999, forest products contributed $35.4 billion to Canada's balance of trade. For the eighth time in the past decade, Canada's balance of trade would have been in a deficit position were it not for the contribution of forest products exports. In other words, without its trade in forest products, Canada's imports would have been higher than its exports and its balance of trade would have been in a deficit position in 8 out of 10 years. In 1999, Canadian exports of forest products went mainly to the United States ($35 billion), Japan ($3.1 billion) and the European Union ($3 billion). Canada imported $9 billion of forest products in 1999. *(See also Forest Products Exports).*

1999	**$ BILLION**	**ANNUAL CHANGE**	
		1-year	10-year
Forest products' contribution	35.4	+11.6%	+6.5%
Total balance of trade	33.9	+78.9%	+10.3%

Source: Statistics Canada

Forest Products Exports

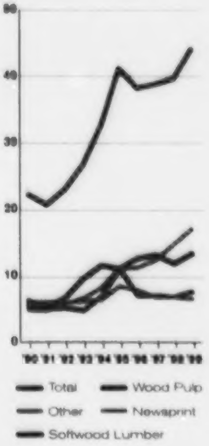
The total value of forest products exports rose by $4.4 billion over the previous year's level to reach $44.2 billion in 1999, an all-time high. The value of softwood lumber exports increased by $1.6 billion because of a more than 10% rise in prices and a slight increase in quantities sold. Wood pulp exports increased by 1 million tonnes to 11.7 million, while newsprint exports increased by 500 000 tonnes. Exports of other forest products posted a dramatic increase of nearly $2.4 billion, rising to $17.7 billion. In the last decade, the value of newsprint and pulp exports peaked in 1995 and is now at a level comparable to what it was 10 years ago. Conversely, the value of lumber exports has doubled and the value of other forest product exports has tripled. These results reflect the diversification of Canada's forest products exports. Exports of mechanical pulp papers, composite panels and prefabricated buildings are catching up with the traditional mainstay—commodity forest products. The principal market for Canada's forest products is the United States, which accounts for 79% of the total value of these exports.

1999	$ BILLION	ANNUAL CHANGE	
		1-year	10-year
Total exports	44.2	+11.2%	+7.1%
Other forest products	17.7	+16.1%	+13.5%
Softwood Lumber	12.6	+13.7%	+9.5%
Wood pulp	7.5	+11.1%	+2.0%
Newsprint*	6.4	-3.9%	+0.9%

* *includes some writing and other printing papers*

Source: Statistics Canada

Forest Products Exports ($billion)



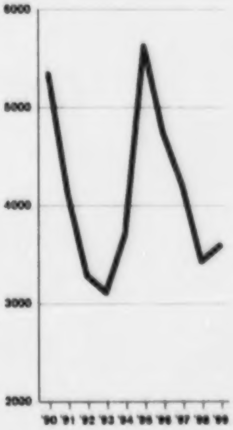
Capital Expenditures

Capital expenditures are divided into two major categories: fixed capital expenditures and repair expenditures. Fixed capital expenditures are new investments that increase existing production capacity, whereas repairs maintain the existing industrial facilities in operation. Data for repair expenditures since 1997 are not available. The years 1998 and 1999 we disappointing ones for fixed capital expenditures in the forest sector, with investments of $3.4 billion and $3.6 billion respectively, both years down from 1997 expenditures of $4.2 billion.

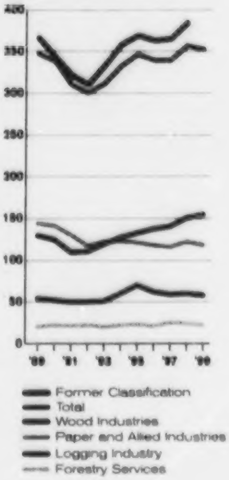
1999	$ BILLION	ANNUAL CHANGE	
		1-year	10-year
Capital expenditures	3.6	+4.7%	-3.9%

Source: Statistics Canada

Capital Expenditures ($ billion)



Direct Employment (thousands)



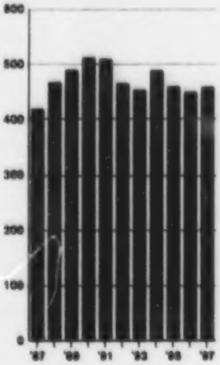
Direct Employment

Statistics Canada's Labour Force Survey is now using a new industrial classification to report the number of jobs per industry. This classification is also used in the United States and Mexico, which will facilitate comparisons between these North American countries. Some industries that were formerly considered wood or paper industries are now being reported as part of other industrial groups under the North American Industry Classification System (NAICS). The wooden kitchen cabinet and bathroom vanity industry, the coffin industry and the asphalt roofing industry are no longer part of the wood or paper industrial groups, while the mobile home industry has been added to the wood industries. As a result, about 30 000 jobs are now reported by industrial groups other than wood and paper industries. Disregarding the changes in classifications, 4 000 jobs were lost in the forest sector between 1998 and 1999. The wood industry gained 4 000 jobs, but 2 000 job losses occurred in forestry services and the logging industry and a further 4 000 jobs were lost in the paper industry.

1999	DIRECT JOBS	ANNUAL CHANGE	
		1-year	10-year
Total industries	352 000	-1.1%	+0.4%
Wood industries	154 000	+2.7%	+2.2%
Paper & allied industries	118 000	-3.3%	-1.8%
Logging industry	58 000	-3.3%	+1.0%
Forestry services	22 000	-8.3%	0%

Source: Statistics Canada

Area Planted and Seeded (thousands of hectares)



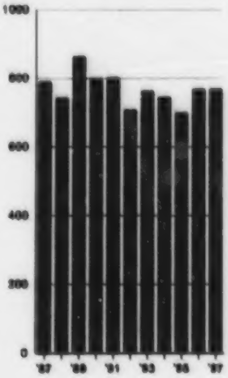
Area Planted and Seeded

Planting and seeding programs are implemented at sites that have failed to regenerate several years after natural disturbances or harvesting. To date, such programs have been successful in reducing the backlog of understocked sites. In 1997, the area covered by planting and seeding programs was 457 788 hectares, up 1.7% from the previous year and slightly below the average of the past 10 years—470 000 hectares.

1997	HECTARES	ANNUAL CHANGE	
		1-year	10-year
Area planted and seeded	457 788	+1.7%	+0.9%

Source: National Forestry Database

Site Preparation and Stand Tending (thousands of hectares)



Site Preparation and Stand Tending

Site preparation and stand tending refers to all silvicultural operations that improve the growth and quality of young trees—from thinning, fertilizing and pruning in recently planted forests, to commercial thinning in more mature forests. In the past 10 years, the area of site preparation and stand tending ranged from 700 000 to 863 000 hectares per year. With 769 128 hectares treated, 1997 was an average year.

1997	HECTARES	ANNUAL CHANGE	
		1-year	10-year
Site preparation and stand tending	769 128	-0.1%	-0.3%

Source: National Forestry Database

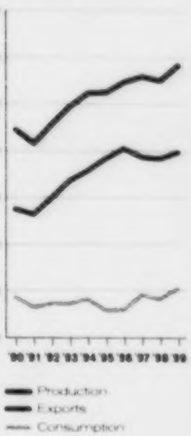
Lumber

In 1999, a 3 million m³ rise in Canadian softwood lumber consumption was accompanied by a matching increase in production. Exports to the United States remained high and overseas exports increased, although they were below the level achieved prior to the Asian economic crisis. In recent years, the provinces affected by the softwood lumber agreement with the United States (Quebec, Ontario, Alberta and British Columbia) have reduced their exports to the United States. Nevertheless, other provinces' increased exports to the United States have been sufficient to offset this reduction and even increase overall Canadian exports to the United States. In 1999, however, American producers increased their domestic deliveries even further and consequently increased their market share at the expense of Canadian producers.

1999	MILLION m³	ANNUAL CHANGE	
		1-year	10-year
Production	68.4	+5.0%	+2.3%
Exports	49.7	+2.7%	+2.9%
Consumption	20.5	+12.0%	+1.0%

Source: Statistics Canada

Lumber (million m³)



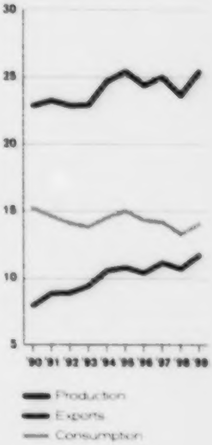
Wood Pulp

In 1999, wood pulp production, exports and consumption were respectively 7.5%, 9.6% and 5.6% higher than in 1998. Increases were recorded in both quantities and prices. In the past 10 years, Canadian wood pulp has been used less and less to produce paper in Canada. It is instead exported to produce paper in other countries. Whereas exports increased by 3.8 million tonnes in 10 years, 1.2 million fewer tonnes of wood pulp were processed into paper in Canada.

1999	MILLION TONNES	ANNUAL CHANGE	
		1-year	10-year
Production	25.3	+7.5%	+1.1%
Exports	11.7	+9.6%	+4.0%
Consumption	14.0	+5.6%	-0.8%

Sources: Statistics Canada; Natural Resources Canada–Canadian Forest Service

Wood Pulp (million tonnes)



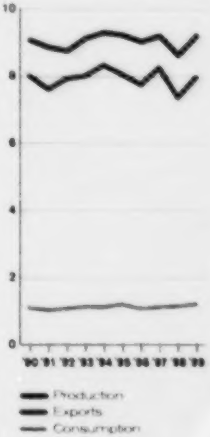
Newsprint

In 1999, Canadian newsprint production increased by nearly 600 000 tonnes, driven by an equivalent increase in exports. The rise in exports is due primarily to a 350 000 tonne increase in deliveries to the United States. American consumption increased while production in the United States fell slightly. Unfortunately for Canadian producers, newsprint prices declined in 1999, resulting in lower revenues than last year despite the increase in the volume of exports.

1999	MILLION TONNES	ANNUAL CHANGE	
		1-year	10-year
Production	9.2	+6.7%	+0.1%
Exports	8.0	-+8.2%	0%
Consumption	1.2	+5.1%	+1.0%

Sources: Canadian Pulp & Paper Association; Natural Resources Canada–Canadian Forest Service

Newsprint (million tonnes)



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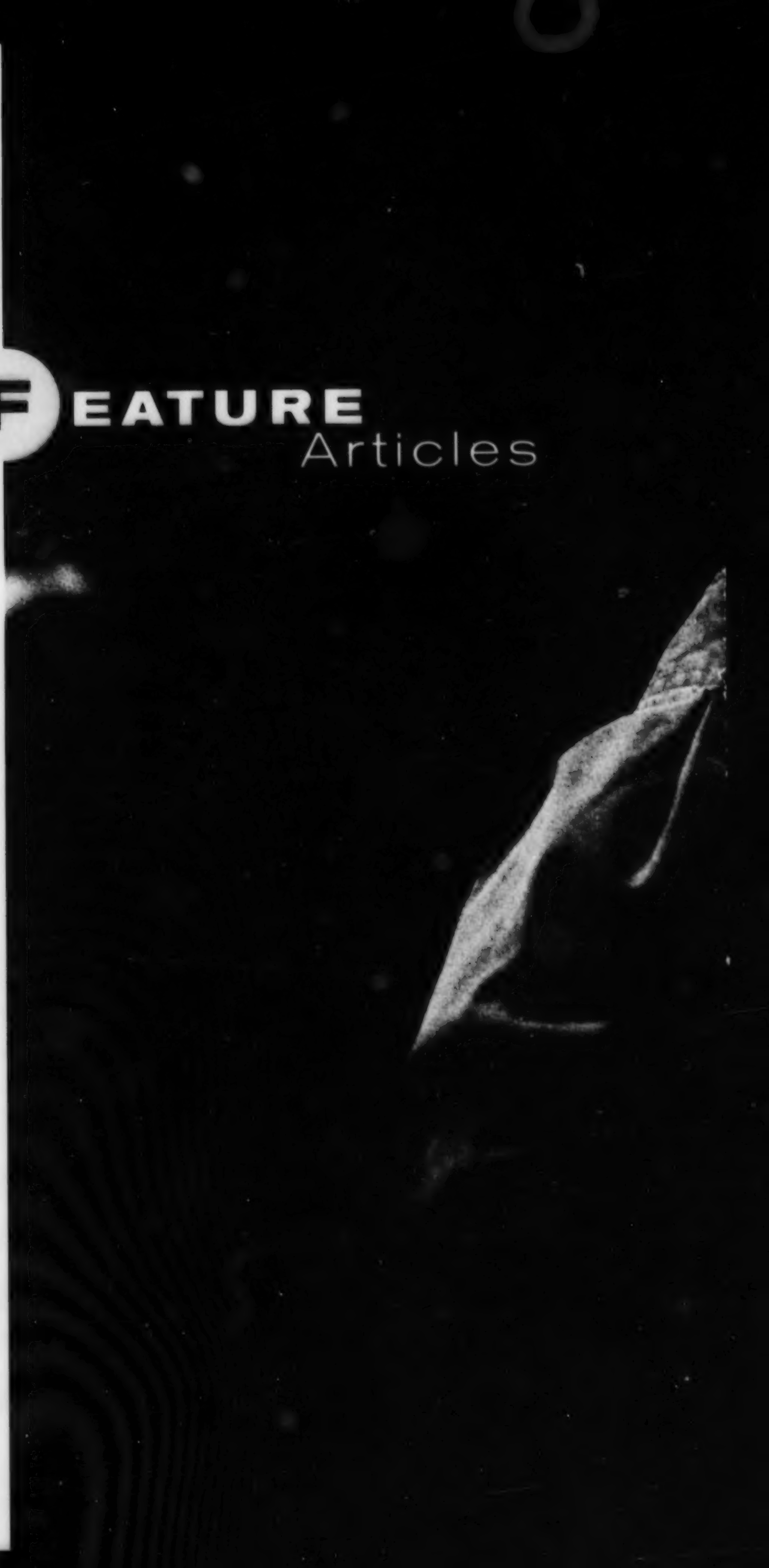
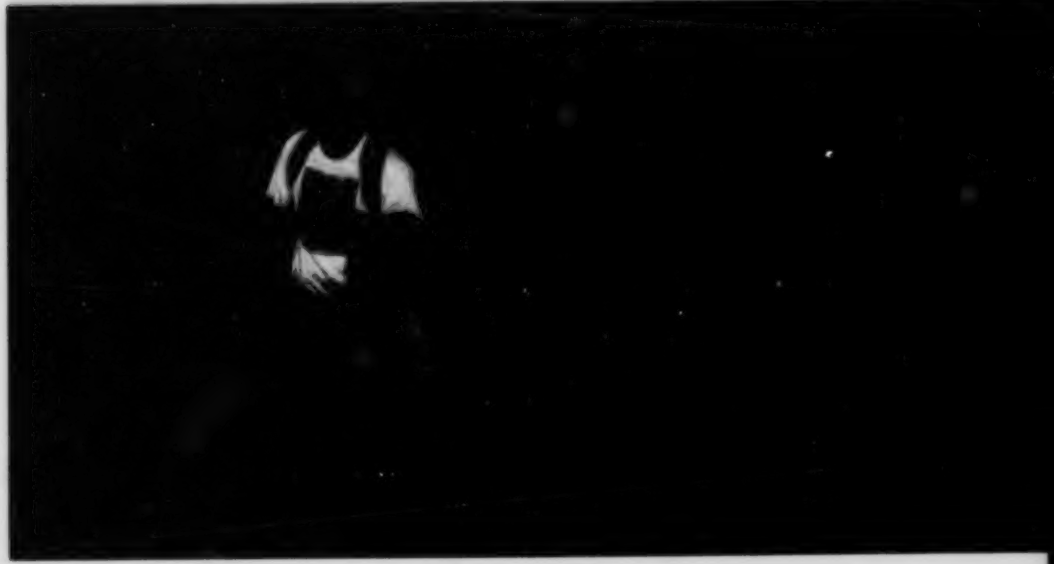


GLOBAL TRENDS: Growing Demands

Forest issues know few boundaries. In today's world, the activities and decisions of one nation are generally influenced by, and impact on, others around the globe.

Increasingly, the future of Canada's forests is guided by the diversity of public values attributed to the resource. To effect public-driven decisions, a well-informed population is crucial.

In this issue of *The State of Canada's Forests*, readers are provided with insights into global trends, the dilemmas faced by Canada's forest resource managers, and experts' perspectives on possible future directions for the sustainable management of Canada's forest resources.



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THE NEED FOR MORE FORESTS

Population growth and the demand for wood fibre

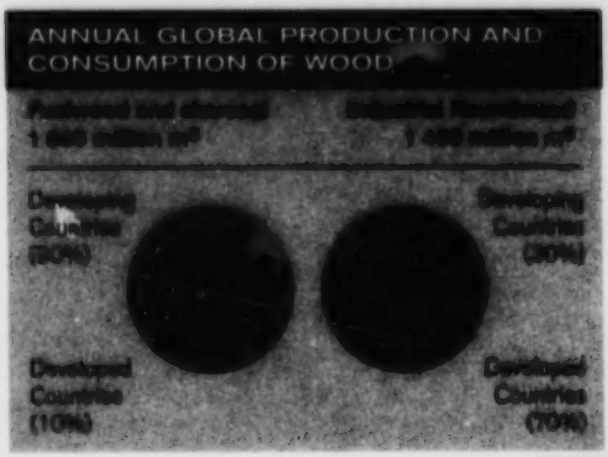
In Canada, where most energy comes from fossil fuels, natural gas, and hydroelectricity, it is easy to forget that wood is still the biggest source of energy for most of the world's population. In fact, this is the main use of wood worldwide. Industrial uses of wood, including the production of sawlogs and pulp and paper, run a clear second to its use as a fuel, a use that is concentrated in the developing nations.

According to 1995 figures from the United Nations Food and Agriculture Organization (FAO), the world currently consumes roughly 3.5 billion cubic metres of wood each year. Just how much wood is that? According to one New Zealand forest expert, each person on Earth consumes the volume equivalent of 1.8 litres of wood per day.

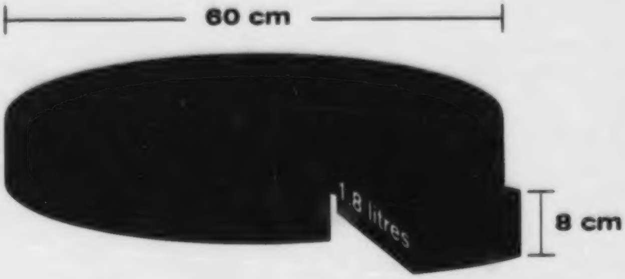
This number can be expected to increase as the new century progresses. The World Resources Institute estimates that the global population will reach 8.3 billion by 2025 and climb as high as 10 billion by 2050. Most of the increase will occur in developing countries. Wood consumption is expected to rise correspondingly, since developing nations will still rely on wood for energy. In addition, some developed nations are now investigating the advantages of burning more wood for energy as an alternative to non-renewable fossil fuels. If this interest develops, demand for fuelwood could increase even more.

As well, wood consumption is expected to grow along with the maturing economies of certain countries, for instance in Asia. Increased consumer prosperity in these countries should boost demand for industrial wood. In comparison, demand in more established wood markets, such as those of North America, will likely grow more modestly.

Another force that could increase demand for wood is society's concern about environmental issues. Wood is more environmentally friendly than many of its substitutes, whose production consumes more energy than wood and releases more emissions into the atmosphere. If there is greater recognition of this fact, more builders and consumers may choose wood over other materials for construction and for household and consumer products, again contributing to greater global demand. On the other hand, the


ANNUAL GLOBAL PRODUCTION AND CONSUMPTION OF WOOD

FAO 1999



Around the globe, the equivalent of 5.6 billion of these wood wedges are consumed every day.

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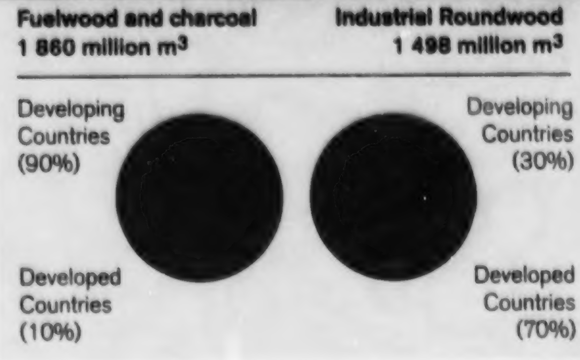

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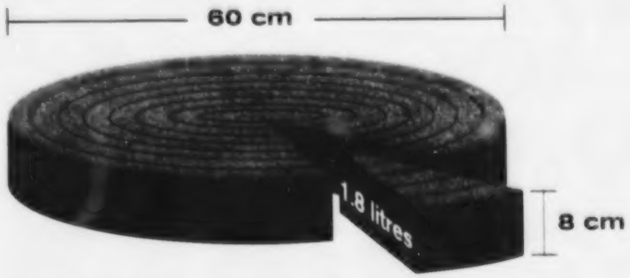

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public movement toward forest conservation, particularly in developing countries, may ultimately counter these environmentally preferable attributes.

Just how much higher will wood demand climb in the future? Although projections vary, by 2050 worldwide consumption of fuelwood alone could increase from today's 1.9 billion cubic metres to as much as 3.5 billion cubic metres per year—the *total* amount of wood now consumed annually. Consumption of industrial wood could grow to between 2 and 3 billion cubic metres, up from today's 1.7 billion.

At the beginning of the new millennium, the pressing question for the world's forest sector is how to satisfy this growing demand for wood while maintaining healthy, sustainable forests. As the World Commission on Forests and Sustainable Development cautioned in its 1999 report, *Our Forests...Our Future*, "Rising population and consumption can potentially overwhelm the world's forests."

This observation is even more sobering when coupled with the latest global figures on forest cover. Between 1990 and 1995, the world's forested area decreased by 56.3 million hectares, a combination of 65.1 million hectares lost (deforestation) in developing countries and 8.8 million hectares gained (afforestation) in developed countries. Evidence suggests that deforestation is still prevalent in developing countries, where forests are increasingly cleared to supply fuelwood and for agriculture.

More than anything, global trends in forestry are unfolding in response to this dilemma: how to boost wood supply and still maintain the health and integrity of the world's forests.

TRENDS IN FOREST MANAGEMENT

Forests and global climate change

There are many compelling reasons why the world must strive to maintain the health and integrity of its forests. Aside from long-recognized reasons such as protecting biodiversity and water resource management, one that has more recently emerged is the role of forests in stabilizing global climate change.

The bulk of scientific evidence today links climate change, specifically global warming, to increased emissions of greenhouse gases, especially carbon dioxide. Forests play a dual role in climate change. On the one hand, when trees fall or are cut down and not used and they begin to decompose, or when wood is burned (as fuel or in forest fires), it releases carbon dioxide and other gases into the atmosphere. (Solid, non decomposing wood products are storehouses of carbon dioxide.) On the other hand, trees serve as carbon "sinks"; they absorb carbon dioxide from the atmosphere during photosynthesis and store the carbon until, as just stated, they begin to decompose or are burned. Forest soils also hold concentrated amounts of carbon, largely from decomposed forest debris and leaves.

Although the science of climate change is still evolving, as is understanding of how forests figure into the equation, it appears that extending forest cover, thereby creating more carbon sinks, can help diminish the effects of global warming. The mitigating role of forests was recognized in the 1997 Kyoto Protocol, the international agreement obligating all signatory countries to cut their greenhouse gas emissions. *(For more* *information on the Kyoto Protocol and climate change, see page 90.)* Among other things, the Kyoto Protocol allows countries to factor in changes in land use and forest cover to help meet their agreed-upon reductions. Thus, Kyoto gives countries some incentive to manage their forests to increase carbon sequestration and decrease carbon emissions.

Along with the forest's impact on climate change, experts are trying to quantify the impact of climate change on the forest. Scientists agree that, if climate change is unchecked, global warming will alter the health and distribution of the world's forests. The boreal forest, which makes up almost one-third of the earth's forest cover (an estimated one-third of which is in Canada) is particularly at risk. According to experts, the stresses of climate change may gradually push the boreal forest northward, ultimately shrinking it as it runs out of soil to grow in and hits the northern waters. As well, global warming has the potential to alter natural forest disturbances like fires, pests, and diseases, thus impacting on the delicate balance of forest ecology.

As the body of knowledge about climate change expands, the importance of maintaining and even increasing the world's forest cover is becoming clearer—a goal seemingly at odds with the world's escalating demand for wood.

Protecting global biodiversity

Thanks to increased research and heightened environmental awareness, the forest's contribution to biodiversity is more acknowledged and better understood than ever before. Forests are complex microcosms, housing two-thirds of the world's terrestrial species, containing rich soils and waters and affecting the ecosystems of adjacent lands and waters. In Canada and many other nations, biodiversity has shifted to the forefront of forest policy in the past decade, becoming a primary forest management objective—more and more frequently referred to as "ecosystem management".

The emphasis on protecting biodiversity has prompted many nations to examine their forests and more closely assess the impacts of their forestry practices. As a result, more societies are restricting activity in or setting aside certain forests, particularly old-growth forests and stands that are ecologically significant or sensitive. For instance, the Philippines recently prohibited harvesting in its old-growth and virgin forests. In Suriname, 1.5 million hectares of natural forest, a full tenth of the country's land mass, have been set aside as a nature reserve. In 1998, Brazil announced that it would grant protected status to 25 million hectares of rainforest.

This move toward setting aside more forest land to preserve its ecological integrity is beginning to gather momentum around the world. It is impossible to know just how much forest will end up in protected areas, but one thing is certain: the amount of natural (or primary) forest available worldwide for harvesting is lessening and will continue to lessen.

Other non-timber forest products and values

Another motive behind conserving forest areas, and one that may lead to further restrictions on commercial activities, especially harvesting, is the increasing public demand to manage forests for values other than timber.

As the world population concentrates in urban centres, more people are turning to nature for their leisure pursuits. In some parts of the world, especially North and South America, ecotourism is emerging as a promising non-extractive source of income from the forest. Ecotourism depends upon the existence of wilderness, a fact that may trigger further decisions to protect natural forest regions. Other recreational uses of the forest are growing as well, ranging from hiking and camping to photography to fishing. In fact, these trends are increasing at such a pace that ecotourism in itself is being recognized as posing possible further threats to ecosystems.

As discussed in *The State of Canada's Forests 1998–1999*, forests offer society an array of benefits—aesthetic, spiritual, historical, cultural, and recreational. The need to manage forests for a multitude of values is now widely accepted in many forested nations and indeed determines land-use decisions. As with the need to protect biodiversity, this need may entail protecting even more forest land, or at least restricting the activities that take place there.

Types of forests that supply wood

Until relatively recently, much of the world's wood came from natural, undisturbed forests. But this is changing. As the FAO has stated: "Timber harvesting is gradually shifting from forests undisturbed by humans to seminatural (second growth) forests (where human disturbance is evident), plantations and trees outside forests." The shift has already occurred in Europe, which is covered with mostly semi-natural forests and is home to half the world's forest plantations. The FAO reports that worldwide, the area of semi-natural forests, forest plantations, and forest fallows on agricultural land is increasing.

> "To meet the needs for wood and non-wood products and at the same time fulfill demands for environmental and social services from forests is the challenge now facing the forest sector. Efforts to find an acceptable balance between production and protection and between use and conservation drive much of the debate surrounding the forest sector today."
>
> ***FAO 1999***

This shift in the types of forest supplying wood is a logical result of past timber harvesting and deforestation around the world. The fact is that in many regions, especially in Europe, there is little natural forest left to harvest. The shift also stems from more natural forests being protected, or at least subject to restrictions, a trend that has removed areas of natural forest from the pool available for timber production.

An influential component of this shift away from natural forests is the rise of plantation forestry. Forest plantations, which have surged in popularity over the past 20 years, provide substantial amounts of wood in some countries. In New Zealand, for instance, tree plantations supply nearly all the country's industrial roundwood *(see page 44)*. In Japan, 44% of the country's forest cover is in plantations. Some countries, such as Brazil, Sweden and the United States, are planning for increases in global wood demand and are increasing production from plantations accordingly. Australia, for instance, plans to triple the area of its forest plantations, moving from 1 million to 3 million hectares by 2020.

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Forest plantations serve a number of purposes around the world. Most are dedicated to wood production and are managed accordingly. This intensive management for production has yielded often dramatic results, greatly improving rotation times and fibre quality in most instances. Some forest plantations are primarily protective, established to halt erosion, conserve water and soil, or protect against wind. But often these plantations are also managed for wood production.

Around the world, plantations are becoming increasingly important to the wood supply chain. In fact, some analysts predict that plantation forests will soon overtake natural forests as a source of wood, and that this trend will intensify in the long run. In fact, the FAO has calculated that, given their high rates of growth, plantations could theoretically provide the total world demand for timber from only 5 percent of the current world forest landbase.

TRENDS IN THE FOREST INDUSTRY

Forest certification around the globe

Back in the early 1990s, when increasing consumer concerns over the environment as a whole and the origin of wood products, specifically, first prompted the idea of certification, many supported the spirit of certification but were unsure whether the practice would ever materialize. Today, however, certification is a growing market reality. Since 1995, the area of certified forest land around the world has grown exponentially. In addition to the two leading international systems, those of the Forest Stewardship Council (FSC) and the International Organization for Standardization (ISO), sustainable forest management standards have been developed at the regional level such as the Pan European Forest Certification System as well as at the country level, such as the Canadian Standards Association (CSA).

CERTIFIED WOOD ON THE SHELVES

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There are strong signals that certification is increasingly becoming a market requirement. This trend started in Europe where some buyers' groups have made the commitment to buy only certified forest products. More recently, the United States' market appears to have been catching up to the European Union trend. The Home Depot, the world's largest lumber retailer, announced in August 1999 that it will give preference to certified forest products in its

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CERTIFIED WOOD ON THE SHELVES

In August 1999, The Home Depot, the world's largest distributor of wood products, unveiled a new wood-purchasing policy. The retailer promised that, by the end of 2002, Home Depot will eliminate from its stores wood from endangered areas and will give preference to certified wood products.

In making the announcement, Home Depot representatives acknowledged that the new policy will not be easy to implement, given today's limited supply of certified wood. However, the chain appealed to its vendors to rise to the challenge by moving ahead with certification. Home Depot, which operates 888 stores, most of them in the United States and Canada, added that its new policy would not appreciably affect pricing or product availability.

In November 1999, IKEA, another international retailing giant, announced an important step toward its ultimate goal of carrying only wood products that originate in well-managed forests. IKEA stated that by September 2000, it would no longer carry wood from ancient forests or other high conservation values forests unless the forest area is certified by the Forest Stewardship Council or an equivalent system. To meet this target, IKEA is also phasing out all purchases of wood from unknown sources.

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procurement. Since then other United States' retailers have adopted similar policies and some home builders are becoming involved as well. At the global level, IKEA, the international furniture retailer, announced in November 1999 that it will no longer use wood originating in "ancient forests" unless that forest is certified *(see box on page 41 for more details on both of these recent announcements).*

Most forest land currently certified is in temperate developed countries in North America and Europe, where there is generally access to an international or domestic-level certification system. At the moment this is also where the strongest markets exist for certified products. The demand for certified products in other parts of the world is currently limited. However, export-dependent tropical countries are working hard to meet certification challenges.

The multiplicity of efforts by wood-producing countries has resulted in many certification systems in the marketplace. Although each system is a reflection of local ecological, social, economic and cultural conditions, there is debate on the level of transparency and non-discrimination between these certification schemes. The dilemma has become how to reconcile these various systems so as to avoid confusion in the marketplace, to ensure that truly legitimate systems are recognized, and to ensure that certification remains a proponent of sustainable forest management and does not lead to unjustifiable obstacles to market access. International discussions in this respect are currently ongoing.

There are still a number of uncertainties associated with certification. One is how it will affect small forest owners, many of whom are still concerned that certification requirements may discriminate against them, may restrict their freedoms as landowners, may be inappropriate for small forests, and may be exorbitantly expensive to meet. Another question is just how extensive the market is for certified products, especially if they carry a higher price tag than uncertified alternatives. Also uncertain is whether certification will improve forest management in the developing countries, where improvements are most needed, but where often there are more fundamental issues that go far beyond the forest sector. But perhaps one of the most basic uncertainties lies in the fact that there is currently no internationally-agreed definition of sustainable forest management *(for more discussion on defining sustainable forestry, see pages 82-84).* The need for such definition would certainly increase understanding and comparability between certification schemes and allow them to relate directly to sustainable forest practices.

Increased competition in the forest sector

The global wood market has been reshaped in the past two decades by the entry of new producers, especially from the Southern Hemisphere, that are growing wood fast and pricing it low. Countries like Australia, New Zealand, Chile, Indonesia, Malaysia, Argentina, and Venezuela are developing new sources of hardwood and softwood that are increasing their market share and posing a competitive threat to nations that produce wood more slowly and more expensively. Pulp production in Indonesia, for instance, went from 325 000 tonnes in 1987 to 3 million tonnes in 1997. The Indonesian government has announced plans to build or significantly expand 56 pulp and paper mills by the year 2010 and expects to convert 10% of the country's land to plantations. As well, fast-growing plantation forests in New Zealand, Australia, and Chile are maturing and expanding; in fact, those countries' annual allowable cuts are expected to double in the next 15 years. Traditionally low forest cover countries, such as Iraq, Iran and India are expanding their forest resource base through planting efforts—particularly afforestation efforts—driven partially in response to their climate change mitigation commitments and their needs for intensified soil conservation and watershed management. Developments like these have the potential to alter the balance of wood supply in coming decades.

Industry observers also note that many Asia-Pacific nations could significantly increase their wood production in the future. The FAO recently conducted a forest outlook study for Asia-Pacific which shows that the region has great potential to boost its production of sawlogs and other fibre (small roundwood, residues, etc.), especially from areas outside natural forests. The largest production potential comes from trees outside the forest—those grown on agricultural land, for example—and residues from harvesting. The study also found that other fibre sources could play an important role in the region, noting that by 2010, "recovered paper and wood processing residues could also meet the region's entire needs for pulpwood." If the region realizes its production potential, or even comes close, it could mean a significant shift in the global forest products market, especially for traditional suppliers of the Asia-Pacific market like Canada.

It is noteworthy that the bulk of wood supply from these emerging competitors comes from outside natural forests. Technology is an important catalyst in the movement toward "non-forest" sources of wood. Advances in harvesting and mill technology and innovations in engineered and composite wood products mean that wood once discarded as small or inferior can now prove useful. Such technological advances have opened the door to wood from semi-natural forests, plantations, agricultural land, and other land outside the natural forest, much of which is smaller in diameter and lower in fibre quality than wood from natural forests. Radiata pine, a major plantation species in some regions, is naturally a low-quality structural timber with poor durability. However, thanks to technology, it can rise above its natural deficiencies and be used in reconstituted board products and plywood and treated with wood preservatives. Aspen is another example of a low-quality species, formerly ignored as a weed tree, that now has industrial uses, the most common being oriented strand board. Because aspen grows so quickly under such a range of soil and climate conditions, it is attracting growing attention as a candidate for planting outside the forest. One company in Finland recently established aspen plantations to support a new grade of paper the company has created from aspen fibre.

One region that could significantly change the dynamics of global wood competition is the Russian Federation. With more forested area than any other country, including about 70% of the world's boreal forest, the Federation is home to a

CASE STUDIES IN FOREST PLANTATIONS

New Zealand was a heavily forested nation before humans settled there—about 80% of its area was covered by natural forests. Now that figure is more like 23%, largely because of extensive clearing, initially by Maori and later by European settlers for grazing, a trend fueled by New Zealand's historic and almost total dependence on farming. A century ago, nearly all the wood used in New Zealand came from natural forests. Today, hardly any of it does. Nearly 90% of New Zealand's natural forests, all owned by the state, are legally protected, and 98% of the annual wood harvest comes from forest plantations. Less than one percent of the 17 million m^3 annual wood harvest is derived from natural forests.

New Zealand began developing forest plantations in the 1920s, mainly to offset depletion of the natural forest. The amount of new planting fell off during the Great Depression but picked up again in the 1950s. Since the early 1990s, the area of new plantations has mushroomed; currently, plantings are increasing by about 60-80 000 hectares a year. At present, forest plantations cover some 5% of the country's land area, or 1.76 million hectares, and wood harvest is expected to double by 2010.

Until the late 1980s, the government played a direct role in regulating and structuring New Zealand's forest industry. The government established about half the country's forest plantations and selected end-uses for the wood that would maximize processing in New Zealand. In 1987, however, the government decided to sell its forests—but not the land—to private industry. At first this quasi-privatization, along with the elimination of government subsidies for planting and forest management, provoked a sharp decline in forest planting. But the trend has since reversed itself and new plantings are at record levels, primarily on the basis of market signals (since there are no longer any fiscal incentives).

Over 90% of New Zealand's plantations grow radiata pine, a species native to the California coast. New Zealand's mild, wet climate is ideal for this species, which grows faster there than anywhere in the world, usually maturing in 20 to 30 years. Radiata pine is a general-purpose timber particularly desirable for pulping, packaging, clearwood, plywood, and engineered board products. Focusing on one well-suited, fast-growing species has enabled the New Zealand forest sector to concentrate its research on site management and genetic improvements to increase overall yield and quality.

New Zealand has weathered criticism for its even-aged, single-species plantations. Those against the practice question, among other things, the effect on soil quality and biodiversity and the trees' susceptibility to pest and disease outbreaks. However, defenders of New Zealand's plantations point out that natural radiata stands in California grow as even-aged monocultures. After four or five rotations of radiata in New Zealand, researchers have found no measurable site productivity loss or site degradation. As well, the plantations do support other life forms, including undergrowth, birds, and aquatic species in streams. New Zealand does maintain strict quarantine regulations to combat biological risks, but there is evidence that this, along with close surveillance and dominant site management practices, including wide spacing and early pruning and thinning, and the relatively short rotation time helps minimize vulnerability to outbreaks.

Shifting to plantation forestry has changed New Zealand in many ways. For one thing, it has enabled the country to set aside most of its remaining indigenous forests to preserve their biodiversity and their cultural and historical values. In addition, plantation forestry has given rise to a new industry, one that has been increasingly important to the national economy. The forest industry now accounts for roughly 76% of New Zealand's GDP and 13% of its overall exports, making it the country's third-largest export earner after meat and dairy products. Forest plantations have diversified the country's land use and its economy, and have increased employment, particularly in rural areas.

Chile first introduced radiata pine plantations in the 1940s—not, like New Zealand, to replace wood from natural forests, but to combat erosion along the Coastal Range in the southcentral part of the country. Now forest plantations cover 2.1 million hectares in Chile, with more than 80% devoted to radiata pine and the remainder mostly blue gum eucalyptus.

While forest plantations still play an important part in checking soil erosion, they have also become the basis of a thriving pulp and solid wood industry in Chile. Beginning in 1974, when the Chilean government introduced subsidies to fund up to 75% of the cost of establishing and tending new plantations, private forest companies started expanding the land base devoted to plantation forests. Even now, with the subsidies almost eliminated, (incentives still exist for small properties and to recover degraded lands) new plantings are at unsurpassed levels, signalling that the economic returns are worth the initial investment. In 1994, Chile's forest sector exports earned roughly U.S.$1.95 billion, almost double the amount earned in 1990.

As in New Zealand, forest plantations and the industry that has grown up with them have changed the employment picture in the regions affected. Many small towns in southcentral Chile have benefited from jobs in silviculture, logging, and processing. In fact, the forest industry employs 2.1% of Chile's active working population, notably more than the 1.8% employed by mining, the principal source of Chile's income. As well, plantations have diminished the widespread migration from small towns and rural areas to the big cities. In fact, the population of rural areas around the plantations is now more stable. This population stability has brought social development, better infrastructure, more business, and better education to the rural regions.

vast and largely untapped forest resource, including almost 55% of the world's softwood.

The Russian Federation is already a net exporter of industrial roundwood, but the real question is how much logging will increase in the future. Some researchers suggest that in 25 years, the region will triple its softwood exports to the Pacific Rim. Already, Siberia and the far east of Russia, the most heavily forested regions, are attracting investors from Asia, Europe, and the United States who see potential for plentiful and inexpensive production of raw logs, especially to feed Asian markets. If, as predicted, harvesting proceeds on a large scale in Russia's natural forests, unleashing a flood of low-priced, high-quality wood into the market, the impact on global competition could be very significant. The impact on forest sustainability, biodiversity and the global carbon balance could be even more significant, a fact that has many observers monitoring the region and industrial developments there.

Competition from non-wood products

There are some signs that, in the near future at least, the wood industry may be in for heightened competition from non-wood alternatives like steel, concrete, brick, aluminum, and vinyl. This competition is especially likely in North America. Currently, the United States steel and plastics industries are spending US$20 million per year promoting their products as alternatives to wood in construction. The steel industry, which is campaigning particularly hard, aims to replace 25% of the wood used in the housing market, partly to compensate for its own recent losses to plastics in the auto industry.

Other, non-traditional wood substitutes are also attempting to establish a niche. For instance, some companies are producing fibre boards made of straw for use in construction, furniture, wood flooring, and cabinetry. The pulp and paper industry is witnessing the entry of alternative fibrous materials as well, the most notable perhaps being hemp.

Market experts predict that the future will bring more aggressive competition from alternatives to wood. In fact, some countries are set to launch wood marketing campaigns to counter this trend. However, others point out that wood's environmental advantages may prevail in the long run, and may in fact lead wood to steal market share from its competitors. Nearly all non-wood alternatives are less environmentally friendly than wood, as they consume more energy in production and often involve pollution, chemicals, and carbon emissions from fossil fuels and limestone. In short, the wood industry may suffer some short-term market losses to alternative products, but if it can promote its environmental benefits, it could recoup these losses and then some. *(For more discussion on marketing forest products from the Canadian perspective, see page 69).*

CANADA'S FORESTS: Striking a Balance

For as long as the nation has existed, forests have been a vital part of Canada's character, heritage, and economy. Forests define the country's natural environment by supporting plant and animal life, contributing to the quality of water and soil, and supplying Canadians with recreational, cultural, and aesthetic pleasures. The forest industry has long employed countless citizens, supported hundreds of communities, and fueled the national economy and international trade.

In recent years, Canada's forests have been attracting increased public attention and concern. As a result, the sector has seen dramatic changes that have reshaped forest values and forest management and practices. More than anything, these changes have underlined the need for balance in the forest—balance between commercial and non-commercial uses, between wood supply and wood demand, and between the values of the present and the requirements of the future.

The recent re-emphasis on non-timber benefits from the forest stems in part from Canadians' general feelings about nature. In 1996, Canadians were polled to gauge how much they valued nature. The survey revealed that over 84% of adult Canadians participated in one or more nature-related activities that year. The poll also underscored the economic importance of nature. Canadians spent $11 billion on nature-related activities within the country, a figure that does not include significant expenditures by tourists who enjoy Canada's natural environment. (Further information on the Survey on the Importance of Nature to Canadians is available on the Internet at http://www.ec.gc.ca/nature/survey.htm).

It is clear that today's forests, as a large component of nature, are highly prized for their "soft" benefits. These non-timber benefits will almost certainly continue to play a leading role in public attitudes toward the forest. This is particularly likely given the greater leisure time of many Canadians; increasing urbanization, which is motivating people to look outside cities for recreation; and the growing international popularity of Canada as an ecotourism destination.

"Sustainable forest management entails the balancing of the economic, environmental and social functions and values of forests for the benefit of present and future generations—a complex and challenging task in the face of the Earth's rapidly expanding population and increasing demands for forest products and services."

FAO 1999

Protected areas

Because of Canadians' emphasis on nature, and because of public concern about environmental issues, the idea of protecting forests from development and resource extraction has been gaining considerable momentum. In response to public sentiment, governments in 1991 pledged to create, by the year 2000, a network of ecosystem-representative protected areas across the country. This pledge has been reiterated numerous times, through various venues.

Although the network is still incomplete, the past decade has witnessed a surge in new protected land across Canada. In fact, protected areas are increasing so rapidly that the current total is uncertain since national inventory compilers are struggling to keep pace. It is certain, however, that the area of protected forest land is greater than ever and is still on the rise. This trend, with its resulting changes to forest use, is a primary consideration for today's forest planners.

Green consumerism

Growing environmental concern over the years has also prompted environmental groups to launch campaigns to exclude certain forest products from the marketplace. Extensive lobbying by these groups has persuaded some customers not to buy wood from natural, old-growth, and ecologically sensitive forests, especially tropical countries where deforestation is prevalent. Green consumer groups have also influenced decisions to protect certain old-growth and natural forests from logging and other activities.

One prominent market development arising from green consumerism is forest certification and product labelling *(see pages 41-42)*. In pursuing certification, a number of Canadian forest companies are curtailing their operations in pristine forests. In essence, certification and other consumer-related trends may eventually render portions of Canada's forests off-limits for harvesting, a change that is prompting wide-scale readjustment of forest management plans.

Aboriginal land claims

A number of Aboriginal land claims are working their way through the Canadian judicial system. Indeed, some claims have been settled and others are nearing settlement. If eventual decisions award Aboriginal claimants title to disputed land, they will likely be granted exclusive use of that land (with certain limitations). In theory, such decisions could change the use of the affected forests, including removing them from the commercial inventory. But for the time being, the outcome of many Aboriginal land claims is unknown. Consequently, these claims are adding an element of uncertainty to forest planning, since it is unclear how they will alter forest use, tenure agreements, and the commercial wood inventory.

Wood Supply

The growing importance of non-timber values has not changed the fact that the forest still supplies wood. Less than one half of one percent of Canada's commercially-productive forest land is harvested each year *(see page 7)*, but that harvest fuels one of the largest industries in the country and satisfies a considerable portion of the world's demand for wood.

In response to public demand for environmentally sound and balanced forest management, governments across Canada have implemented sweeping changes to forest policies, laws and regulations. Further, Canada's forest industry has been continuing to overhaul its planning, operations, and objectives during the past decade. Forest companies still operate with profitable wood supply as their primary goal, but they also recognize that this supply must be sustainable and compatible with other forest uses and priorities. For both governments and the forest industry, adapting to public needs and concerns while supplying the growing worldwide demand for wood has become a complex balancing act.

Changes in supply

Current views on non-timber benefits, protection of forest land, green consumerism and Aboriginal land claims have redrawn the lines of forest use. Across the country, areas of forest that were once available for wood production are being protected, designated for other uses, or set aside until decisions are reached about their ownership and status.

In many cases, this adjustment of commercial forest lines has meant that industry must reassess where it will get its current and future supply. Some companies are faced with pushing farther into remote territory. Companies that remain in accessible areas are usually settling for smaller trees, since the most accessible commercial forests are often in their second or even third growth. As the timber boundaries shift, the forest industry must adapt to a smaller area of "socially acceptable" commercial forest—this, despite the fact that according to some estimates, Canada's total forest area may be increasing.

"The size and ecological importance of Canada's forests have led us to recognize that they must be managed to reflect the range of local, national and global values—a task requiring much effort on the part of Canada's forest community as it seeks to balance sometimes conflicting priorities."

Canada's National Forest Strategy 1998–2003

Changes in harvesting methods

Concerns about the environment and about forest use and ownership have changed not only where forest companies harvest, but also how they harvest. During the 1990s, governments responded to public opinion by revamping forest laws, regulations and policies. Similarly, many operators responded by turning to variable retention harvesting—cutting specific trees but leaving others behind to preserve habitat or forest characteristics. Some operators have adopted selective cutting in addition to clear-cutting; others have abandoned clear-cutting altogether, even though it may still be the most economical and appropriate harvesting method for Canada's largely even-aged and often over-mature primary forests.

Additional harvesting modifications have come about in response to current forest priorities. The establishment of buffer zones along roadways and waterways is now standard practice. Logging equipment and transport trucks have been redesigned to leave a lighter footprint on their surroundings. Roads and water crossings are built differently to mitigate further environmental impact. Some companies are logging with helicopters and balloons to minimize disturbance to the landscape.

These changes in logging operations have been welcomed for their softer impact. But they have also altered traditional wood supply equations.

Selective cutting is more expensive than clearcutting, since it requires sophisticated machinery and a more skilled, intensive workforce. Yet it yields less wood. Advanced equipment and improved methods are also costly, and their adoption has further increased the cost of wood delivered to the mill. In light of such changes, supplying enough wood—and supplying it profitably—is a greater challenge than ever for the forest industry.

Changes in competition

Canada's forest industry is doing business in an increasingly crowded and competitive marketplace *(see also pages 42-46)*. New suppliers, many of them tropical and Southern Hemisphere countries, are producing huge quantities of fibre quickly and cheaply. This plentiful, inexpensive wood has entered the market just as the Canadian industry has been facing altered supply and increased wood costs. The result is that current markets are posing a challenge to Canadian wood products.

As well, recent technological innovations have made species like the southern hemisphere's fast-growing eucalyptus—a species traditionally not considered commercially desirable—usable in pulp and paper and other products. But Canadian wood retains its quality advantage in this respect. Even with these technological innovations, the need for certain wood fibre characteristics is still required by many manufacturers. Longer wood fibre, characteristic of Canadian wood, adds strength and structure to many end products, especially paper and textiles. For this reason, many users of southern hemisphere species continue to import Canadian wood to mix with the faster growing, shorter fibre species in order to achieve acceptable quality in their end products.

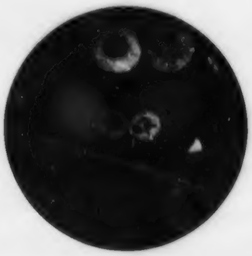
In another related trend, some major importers of Canadian forest products, notably the United States and certain Asian countries, are expanding their domestic production and thus becoming more self-sufficient. Experts have identified a huge potential for Asia in particular to boost wood production to supply more of its own needs.

Gradually, these cumulative changes have been eating away at Canada's market share, especially in forest commodities, long the mainstay of the industry. This trend will undoubtedly continue, especially with many forest plantations around the world nearing maturity and the area of plantations increasing exponentially.

Canada's Forest sector at a Crossroads

Canada's forest sector is at a critical juncture. It is clear that Canadians want their forests managed for numerous objectives, only one of which is wood production. It is also clear that the forest industry must adapt to these broader objectives while remaining competitive and able to meet the escalating world demand for wood.

As the Canadian forest sector enters the new millennium, it faces a formidable challenge—how to balance these potentially competing objectives to satisfy the needs of all forest users, today and in the years to come.



CANADA'S FORESTS in the New Millennium

In 1999, the World Commission on Forests and Sustainable Development, in a comprehensive review of world forest issues, issued this warning for the future of forests: "The implication for forests is that with business as usual their decline will continue. There will be further erosion of the capital resources of the earth, further reduction in the capacity of countries to meet their development needs in a sustained way, and social and political unrest related to land use."

In Canada, we have made great strides toward sustainably managing our 10% share of the world's forests. But is this progress enough? Are our current practices sufficiently forward-looking to see us into the new millennium? Will "business as usual" enable us to meet the future demands on our forests?

Faced with growing global demands for wood, less accessible operating forests, and increasing emphasis on non-timber benefits, the forest sector is under more pressure than ever before to make the most of this precious natural resource. For this edition of *The State of Canada's Forests*, we interviewed representatives from various forest sectors—professional foresters, provincial forest departments, industry associations, forest companies, forest research institutes, environmental groups, Aboriginal groups, private woodlot owners, and other forest associations and alliances—to see what they envision for Canada's largest natural resource sector in the 21st century.

WHAT IS IN STORE FOR CANADA'S FORESTS?

For many, the onset of the new millennium seems a natural time to reflect on the past and project into the future. For many Canadians who work with and in the forest, it is a time to raise crucial questions. Given global forest trends and current Canadian forestry practices, how can Canada make the most of its forests? How can forests continue to strive for a balance of non-timber needs with those of the thriving forest industry on which Canada's economy depends? Is it possible to manage for non-timber values and for timber production without detracting from either goal? How can a less accessible operating forest produce more wood to satisfy increasing worldwide demand?

The State of Canada's Forests 1999-2000 (SOF) interviewed numerous members of the forest community to seek their views on some of these questions. Most of them were quick to point out that the country cannot rest on its recent advances in sustainable forestry. Most acknowledged that Canada is managing its forests well based on current needs, but warned that it is crucial to look ahead to the needs of the future.

As discussed in "Global Trends: Growing Demands," *(pages 36-46)* one of the most pressing developments on the horizon is the mounting global demand for wood. This increasing demand has many consequences for Canada's forests, but two stand above the rest. First, if Canada's forest industry does not meet rising demand by producing more competitively priced fibre, it will rapidly lose market share. For an industry dependent on exports, the potential economic repercussions are evident. The forest sector has already experienced the beginnings of such a trend, having gradually lost some of its share in the forest commodities market over the past several decades.

Second, if Canada does not meet rising demand, that demand may well be filled by emerging suppliers who do not equal Canada in sustainable forestry practices. As a nation committed to sustainable forest management, Canada has a duty to ensure that global forests remain healthy and productive. If growing wood demand is not satisfied by Canadian producers, it will be satisfied elsewhere, perhaps at the expense of the environment. Canada must contribute its share to the wood supply equation, or else risk the further degradation of global forests to meet immediate needs.

Those interviewed for this article voiced different opinions on how Canada's forest sector should meet the future, especially when describing the details of how forest management and industry should evolve. But despite these differences, many common themes surfaced in the discussions.

One message emerged more clearly and consistently than any other: change in the forest sector is both inevitable and desirable. The forest community has made great strides in improving how Canadians manage, work and live in their forests, but they are only the first steps in a long journey. Like all journeys, this one requires careful planning, adequate provisions, and above all, foresight. Without vision, without a clear picture of the destination it is headed for, Canada's forest sector could find itself adrift in the 21st century—aimless, unprepared, and in trouble.

THE FUTURE OF FOREST MANAGEMENT

Those interviewed unanimously agreed that future forest management will be defined by the continuing and perhaps intensified need to balance different forest values. This has been the theme of forest management in past decades, and it will continue to motivate forest decisions in the decades to come.

The dilemma for the forest sector is how to create that balance. According to many, true balance is impossible without significant changes in the way society views the forest and its role in Canada's culture, the economy, and the environment—all of which are intertwined.

Managing Forests for Multiple Values

"In societal terms, the forests will change in that there will be even more sharing of the various forest resources and more collaborative decision-making about how the forests will be used."

Roxanne Comeau, Executive Director, Canadian Institute of Forestry

Everyone interviewed concurred that it has become increasingly important to manage Canada's forest land in a way that respects all the values people attach to it. Environmental, economic, historical, recreational, aesthetic and cultural values—all must be considered in forest planning and management.

Foremost among forest values is biodiversity. One spokesperson noted that for most people, the word "jungle" conjures up a vivid scene, complete with animals, plants, water, and smells, but the word "forest" is still equated with trees. It is important that people learn to envision the forest as a more detailed picture, a thriving ecosystem.

Several representatives of environmental groups commented that at this point, Canada's forests are for the most part in good shape. Companies that engage in condemnable forest practices and that are unconcerned with biodiversity are a thing of the past. Forest managers are maintaining a good balance between the objectives of ecological integrity and forest production, so good, in fact, that Canada has become an international model of sustainable forest management.

But the environmentalists were quick to point out—and in this they were joined by individuals from other forest groups—that the Canadian public is largely unaware of these advances and of Canada's respected position in the forestry world. Public opinion has not kept up with nationwide changes in forest practices. Consequently, too many Canadians are willing to believe isolated campaigns that portray the country as environmentally irresponsible, as the "Brazil of the North." In the words of one senior environmentalist, "This is rubbish. We are looking after our forests well now, and we have the know-how to continue doing so into the new millennium."

Some individuals predicted that the issue likely to top the environmental agenda in the 21st century is climate change. They stressed that if Canada is to meet its international commitments under the Kyoto Protocol *(see pages 90-91)*, the forest will have to play a central role. As a result, forest management will include an even greater emphasis on climate change, and forest managers will become preoccupied with increasing forest biomass to sequester carbon. The forest sector as a whole, and professional forest practitioners in particular, will have to become much more knowledgeable about the science of climate change.

Protection of Forest Regions

> **"An issue in the future will be government's commitment to completing the network of protected areas in the country. We are not on track with our commitments in this area, and there will be more pressure on governments to live up to their commitments and set aside land."**
>
> *Colin Maxwell, Executive Vice-President, Canadian Wildlife Federation*

As discussed in pages 47-51 ("Canada's Forests: Striking a Balance"), Canadians have been advocating that more of the nation's land be protected from industrial and other activities. There is particular interest now in preserving old-growth forests, forests that shelter species at risk, and forests that are otherwise ecologically sensitive. The individuals interviewed agreed that this trend would continue well into the future.

Some noted that certain forest areas will command more attention than in the past. For instance, there may be more emphasis in the future on preserving the remaining forests in southern Canada, especially within 100 kilometres of the United States border. Society will step up the pressure to keep this part of the country aesthetically pleasing, and forest management in this strip will find itself heavily governed by public opinion. Because the population along the Canada–United States border is increasingly urban, people who live in this region will consider it even more vital to have forested areas nearby. Such emphasis will place a good deal of responsibility on the shoulders of private forest owners, who own much of the land in this strip, to manage their properties sustainably and keep them aesthetically pleasing.

Recently, the boreal forest region has attracted attention and study, most notably by the Senate Subcommittee on the Boreal Forest. In its report released in June 1999, the Subcommittee remarked that "the demands and expectations

> "There will certainly be economic problems if we subtract certain territories from forest development, but it will be very easy to get around them if we agreed, in Canada, to move to more intensive forestry in certain areas. We practice mostly extensive forestry in Canada; we have very little intensive silviculture. In Quebec, we do not have any.
>
> "Most of the objectives in forestry are based on natural regeneration. In fact, we use reforestation to make up for the lack of natural regeneration. We have not decided to look for a tripling or quadrupling of productivity around the mills and to compensate for the protection of areas in this manner."
>
> *Dr. Yves Bergeron, Professor, Sustainable Forestry, Université du Québec en Abitibi-Témiscamingue, appearing before the Senate Subcommittee on the Boreal Forest.*

placed on Canada's boreal forest have escalated to the point where they cannot all be met under the current management regime." *(See page 12 for more information on this Senate Subcommittee report).* Among other things, the Subcommittee recommended more protection of the boreal forest, specifically that up to 20% be protected, that logging be limited in old-growth sections, and that harvesting be prohibited where the boreal forest approaches the northern tree line.

There is, however, some dissent among forest specialists as to the ecological soundness of increasing protected areas. Some of the environmentalists interviewed said that Canada must be careful about how it implements protected area strategies citing that highly protected areas do not always favour wildlife. Most wildlife cannot flourish in an area that is exclusively treed; instead, it needs a variety of land cover, including some forest and some clearings, to travel and feed. Nature has always provided this variety by opening up parts of the forest through diseases, pests and forest fires. But if any of these natural phenomena are suppressed in the name of protecting the land, other parts of the ecosystem will suffer. Similarly, there is evidence that parks are not necessarily as beneficial to wildlife as one might expect, largely because of the clearing, trail-cutting and other human interventions that accompany intensified leisure use of the land—including the pressures that might occur from increased human traffic.

The Senate Subcommittee heard similar cautionary evidence from some of its environmental witnesses. Some witnesses also pointed out that protecting certain areas puts more pressure on the remaining land base, which then has to provide all the products and benefits the protected area cannot provide. The remaining land thus sees more intensive use overall.

Individuals who criticize the move toward more protected areas generally describe themselves as advocating a landscape-based approach to forest management—that is, managing the entire forest for all its values. This approach entails seeing the forest base as a whole, interrelated system that cannot be carved up into different uses. *(There is further discussion of this approach on page 59, under "Apportionment of the Forest.")*

Growing Aboriginal Role in Forests

"Major issues for the future are the resolution of land claims and the institutionalization of Aboriginal and treaty rights in forest policy, so that Aboriginal people can have an equitable share of Canada's resources, enabling them to participate equally in industry and to use land according to their traditions."

Harry Bombay, Executive Director, National Aboriginal Forestry Association

Many of the people interviewed, especially those from British Columbia and the territories, underscored the importance of Aboriginal land claims for the ownership and use of forest resources across the country.

Aboriginal representatives stressed that Aboriginals in Canada must gain better access to natural resources, and must be free to manage those resources according to their own needs. In some countries, for example, New Zealand, Aboriginal rights are automatically factored into natural resource management. For the most part, said some, this does not happen in Canada. The tide is shifting somewhat with court decisions like Delgamuukw, which compels governments to consult with non-treaty bands that claim title to the land before allocating natural resources. However, many specific claims and other ownership and rights issues must be sorted out before the full extent of Aboriginal rights to the forest becomes clear.

In regions where land claims have been settled, or are nearing settlement, it appears that Aboriginal forest owners will want to derive a range of benefits from land, some traditional and spiritual, some life-sustaining, and some commercial. In the Northwest Territories, for example, where sizable tracts of forest are now in Aboriginal hands, native Canadians are managing the land through co-management boards and are cooperating with the forest industry to earn income from timber harvesting. Some individuals commented that one laudable outcome of more Aboriginals taking over forest management is that decision-making will move closer to the communities that actually live in the forests.

Today, many forest companies and managers consult local Aboriginal groups on forest decisions anyway, regardless of outstanding land claims or legal precedent. This is a natural offshoot of the public-oriented, multi-stakeholder approach that has come to characterize forest management in Canada over the past decade. Nonetheless, predictions are that Aboriginal consultation and traditional land uses will increasingly shape forest decision-making in the future.

Growing Importance of Private Woodlots

"Not many Canadians recognize how important private woodlots are in our country; they don't realize their overall contribution. There needs to be more public education to tell people about the role woodlots play in sustainable forest management."

Bob Austman, President, Woodlot Association of Manitoba

Although only 6% of Canada's forests are privately owned, this seemingly small percentage includes some of the most visible and accessible forest land in the country. Canada's 425 000 private woodlot owners own much of the forested land around urban centres as well as along the Canada–United States border, as mentioned earlier. A number of the forest representatives interviewed anticipated greater recognition of private woodlot owners as stewards of some of Canada's most prized forest land. They emphasized that the country's urbanites, the vast majority of the population, unknowingly depend upon private forest owners to maintain healthy and attractive forests around them. As the population grows more urban, this dependence can be expected to grow.

Private forest owners and others noted that along with these stewardship responsibilities come difficulties, many of them financial. Although woodlot owners are caretakers of some of the most visible forest land, they are among the least able to afford the full range of forest management. The capital costs of management, protection, and silviculture are high, and woodlot owners have little economic incentive to make the necessary investments. Of primary concern for the private forest sector will be finding ways of funding forest management, including potential reforms to income tax treatment of woodlot owners.

Some individuals commented that as harvestable wood close to the mills becomes more scarce, more companies will be turning to private woodlots to supplement supply. How well woodlot owners will fill this need depends on the action they take today. For example, in New Brunswick, woodlot owners are currently logging faster than they are replacing their stock. This may be a short-lived situation, in which case it will not seriously affect the forests, but if over-harvesting continues for a decade or more, it could have long-term consequences. Forest owners in the region could find themselves without enough mature trees to continue their operations—a shortfall that would affect not only them but the companies dependent on them, not to mention the impact on forest ecology. The point was made that woodlot owners must be forward-looking enough to manage their forests wisely today so that they can provide for tomorrow.

It was also observed that industry must do its part to encourage sound management of private forest land. Industry incentives, already offered by some companies, are one avenue. One Maritime pulp and paper company, which procures about one-quarter of its supply from private woodlots, pays a bonus for fibre from managed woodlots. It also provides its private suppliers with seedlings at a nominal price to encourage them to replant their forests.

If woodlot owners plan well, said one individual, and especially if they get cooperation from industry, they can take advantage of increased demand when it comes and reinvest some of their profits in the forest. If handled properly, and if woodlot owners are educated about the importance of woodlot management, industrial demand could ultimately enhance the management of private woodlots, as owners come to realize there is economic value in having productive, healthy forests.

Intensive Management for Timber Production

"Our working forest is shrinking in Canada. This means we need to do a better job with what we have, managing it more intensively to maximize yield."

Jack Munro, Former Chair, Forest Alliance of British Columbia

Nearly everyone interviewed made the same observation about forest management—that Canada must adopt more intensive management and silviculture to boost timber yield on a limited area. Many saw this as the only realistic response to current and upcoming constraints on availability and increases in demand.

A few individuals said that wood supply per se will not be a problem for Canada in the future. They commented that Canada is too heavily forested to run out of wood, and that industry will continue to find fibre supply where it can, adopting whatever technological breakthroughs are necessary to make that fibre affordable (if remotely located) and usable (if low quality). Nonetheless, most of these individuals still favoured the adoption of more intensive management, noting that advanced biotechnology, tree breeding, and silviculture can only benefit the supply.

Numerous forest stakeholders specified that intensive management should be applied to limited forested areas designated primarily for timber production. As one spokesperson said, "We will see areas set aside for fibre production, dedicated to this purpose, with other segments of the forest essentially left alone or managed for a variety of purposes." These pockets of intensive management would be best situated near the mills to keep transportation and other access costs down, thus avoiding the drawbacks, both economic and ecological, of pushing into more remote parts of the natural forest. The lower production costs and greater yield of such a system, many observed, would go a long way toward helping Canadian industry remain globally competitive.

Some individuals suggested focusing this intensive management on non-forest land (afforestation). They noted that Canada has large expanses of marginal farmland that is not productive, which could be converted into forests and managed intensively to supply industry. In the minds of some, such an approach would be a variation of plantation forestry (a topic discussed in the next section).

A question that inevitably arises in discussions of future supply is whether Canada will ever buy wood offshore to feed its industrial needs, perhaps from somewhere like Siberia, where supply is plentiful and cheap. Nearly everyone interviewed rejected this idea as unlikely. Some remarked that companies in certain regions of Canada already import some fibre from the United States to augment supply of certain species, but the practice is not significant enough to constitute a notable trend. The general consensus is that Canada should and will remain largely self-reliant in its supply—a prospect many consider even more attainable if the working forest is managed more intensively.

Apportionment of the Forest

"As the land base changes—more parks, protected areas, riparian zones, old-growth preservation—the operating forest will become more focused and visible. This may mean setting aside areas for intensive management the way we currently set them aside for parks or protected areas. There may be concern expressed to this approach to forestry. But the shift may be necessary."

Daniel Graham, Deputy Minister, Nova Scotia Department of Natural Resources

"As global population and wealth expand, the area of the earth untrammeled by humans steadily decreases. In the temperate zones, only Canada and Russia still harbor great tracts of true forest wilderness. ...

"The forest products industry can continue to push into this untapped reserve, thus fighting both the tough economics of the extensive economic margin where the last tree cut always carries no value, as well as the tough politics of environmental concern and the bureaucratic regulations that are inevitably associated with it. The alternative is to deploy our forestry skills to minimize the land area required to produce the forest products needed by society. By doing so we will help to preserve the wild places all foresters love, and to sustain the long-term economic prosperity of those communities and regions whose economies depend on the forest products industry."

Clark S. Binkley, "Ecosystem Management and Plantation Forestry: New Directions in British Columbia"

The idea of apportioning the forest into different use categories came up in discussion with most of the forest representatives interviewed. In fact, it appears from these discussions and from some recent reports and policies that apportionment is emerging as a "hot topic" in the forest sector.

Of those interviewed, nearly all who favoured the idea of apportionment considered it the most realistic solution to the simultaneous need to protect certain forest areas, reduce harvesting in the natural forest, manage forests for a range of non-timber values, and still increase wood production. Many stated that it was both inevitable and preferable that Canada set aside limited areas for intensive timber management and leave the rest of the accessible forest much as it is: part of it protected, and most of it managed for multiple benefits.

The notion of dividing Canada's forest land into use or management categories was reinforced by the report of the Senate Subcommittee on the Boreal Forest *(see page 12)*. In its conclusions, the Subcommittee recommended that the boreal forest, which constitutes most of the country's forest, be divided into three categories: (1) an amount up to 20% of the forest base that would be managed intensively for timber production, (2) an amount up to 20% that would be set aside as protected, and (3) the remainder of the boreal forest, which would be managed—but less intensively—for a variety of values, including biodiversity, hunting, tourism and recreation, as well as for timber production.

A similar philosophy is the basis for Ontario's 1999 Forest Accord, which earmarks at least 12% of the planning area for protected areas and designates other portions of the forest as "special supply areas," limited areas to be managed intensively to improve fibre yield. Apportionment is also in line with the views of the World Commission on Forests and Sustainable Development, which in its 1999 final report recommended "improving the allocation and management of forest lands for different purposes: conservation, production, community-based forestry."

Numerous forest representatives interviewed advocated forest plantations as one component of an apportioned forest. Some went further, stressing that forest plantations are critical to the future of Canada's forests and forest industry. "Above all," said one senior forest researcher, "what we need to address in Canada right now, because of its implications for our future, is plantation forestry. It is becoming important around the world, yet there is still little interest in it in Canada. For this to happen, there must be a profound change in how we think about our forests."

As discussed in "Global Trends: Growing Demands" *(pages 36-46)*, forest plantations are expanding around the world and are expected to become central to wood supply in the future. Plantations are a mainstay in some countries, like Chile and New Zealand *(see pages 44-45)*, where they have revolutionized forestry by producing concentrated yield on a limited land base. But plantations are also an important part of forestry in more traditional wood-producing nations like the United States, Sweden, and Finland. Yet the practice is almost non-existent in Canada (the Christmas tree industry being a notable exception). Because Canada has always possessed such vast natural forests, plantation forestry has seemed unnecessary and redundant to many. Evidently, that opinion is changing now that resource use is more scrutinized than ever.

A number of the people interviewed acknowledged that adopting plantation forestry in Canada would entail a complete rethinking of how Canadians view their forests. Some said it would mean approaching forestry more like agriculture: as an activity dedicated to producing a consumable and renewable product, and doing so intensively and sustainably.

In general, the advocates of plantation forestry enumerated several advantages to the practice. First, plantations could provide a valuable way to use marginal farmland. One individual pointed out that this sort of land conversion is well underway in the United States, where marginal farmland is being planted with hybrid poplar, a species that has a short rotation time—between 15 and 20 years—that grows well, and that is marketable. In Canada, farmers and other landowners could benefit from contracting out their land for development as forest plantations, especially now that more landowners are finding small-scale farming unprofitable.

A further advantage some people cited was that forest plantations could help Canada fulfill its international commitment under the Kyoto Protocol to reduce greenhouse gas emissions. In particular, if plantations were created by reforesting land originally cleared for agriculture or other purposes, the net effect would be more forests and hence more carbon storage.

Another benefit of plantation forestry, according to its proponents, is that it enables defined areas of land to be managed intensively for one purpose: timber production. Again, this usage mirrors agriculture, in which tracts of land are cultivated and tended for the single purpose of food production. Modern agriculture has revolutionized food production, vastly improving its quantity and quality as well as per-hectare yield. The same thing could happen with forestry. Plantations would enable forest managers and researchers to concentrate on hardy species that suit the growing conditions, and that produce usable fibre within the shortest possible time.

"The next ten years or so will see large areas of commercial short-rotation plantations (for pulpwood) come on stream in the Southern Hemisphere... Greater areas of older plantations established for the production of sawlogs will also start to be harvested in countries such as Australia, Chile, New Zealand, South Africa, the United Kingdom and the United States. These plantations will provide the greatest share of the expanded wood production potential expected in the future. In contrast, very few countries are likely to be able to expand production sustainably from the natural forest without considerable investment in silviculture."

FAO 1999

Furthermore, plantations dedicated to timber production need not mirror the natural forest, since they would not be managed or viewed as natural forest. Unlike the natural forest, they would not contain a variety of tree species and ages, they would not support a complex system of wildlife, and they would not be expected to satisfy non-timber needs. This would simplify their management and also streamline their costs, since all of the money invested would go into the saleable product; little would need to be spent on other, non-commercial, hence non cost-recoverable, forest uses.

Various advantages of reforesting agricultural and other cleared land were also articulated by witnesses before the Senate Subcommittee and mentioned in its final report. In addition, the concept is endorsed by the World Commission on Forests and Sustainable Development, which included among its final recommendations "intensifying wood production through expansion of plantation forestry on degraded and vacant lands and improved productivity in secondary forests."

Some of the interviewees suggested that plantations could also be situated within the existing forest, especially in recently harvested, productive areas near the mills, to keep delivered costs low and offset the expense of establishing the plantations. Such planted forests would relieve pressure on the natural forest to satisfy increasing fibre needs, and would provide convenient and cost-effective locations for intensive management for yield.

A few of the individuals interviewed commented that Canada already has a version of plantation forests. When a company harvests an area, the area must be regenerated, which can mean replanting or seeding. The planting is usually done all at once and in neat rows of native species, resulting in the regular, even-aged, plotted appearance of a plantation. Also, the company has to apply treatments until the reforested area reaches the free-to-grow stage. However, the principal difference between these replanted forests and the kind of plantations advocated by many in the forest sector is that the former are not set aside and managed solely for timber production. They are part of the overall landscape and are consequently managed for a variety of uses and benefits, including or excluding timber production. According to some, this is precisely why replanted forests in Canada do not receive the intensive silviculture needed to boost yield.

A small number of the forest representatives approached expressed reservations about dividing Canada's forests into different uses and voiced criticisms of plantation forestry. Those opposed to apportioning the land described themselves as favouring a landscape or extensive approach to forest management—managing the entire forest for all values, seeing the forest as a whole, interrelated system that should not be divided into different uses. Several environmentalists pointed out that apportioning the forest, protecting some areas and intensively managing others, is unfavourable to wildlife because it alters their natural habitat.

Some of the criticisms of plantations concerned their aesthetics: they look "unnatural," they would appear redundant in a country so heavily forested, they would be unsightly when harvested. Other criticisms concerned finances and logistics: it would be hard for industry to justify financing plantations on Crown land without a sufficiently long term leasehold commitment, and plantations might not be suitable for the geography of certain regions. Some reservations centred on the view that plantations do not support a wide range of wildlife.

However, those in favour of apportionment and plantations stressed that pockets of intensively managed forest should make up only a small proportion of Canada's land base. Furthermore, these individuals saw apportionment as helping to preserve, not interfere with, the natural forest and its ecosystems. In the words of one industry representative, "Our forest resources in Canada are not shrinking, despite what the majority of Canadians believe; our forests are growing. That makes it feasible to dedicate a small portion of them to intensive management for wood production."

Forest Research and Development (R&D)

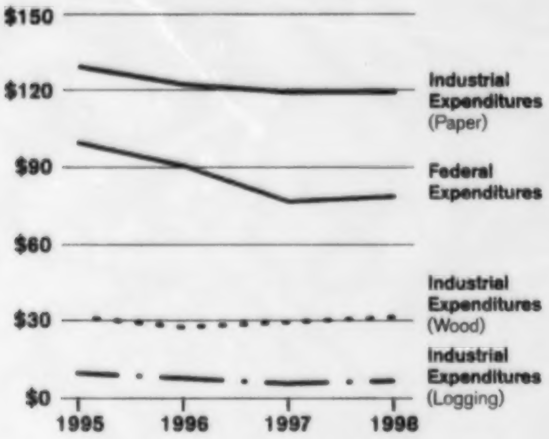
"We do not take a long-range approach to R&D. Governments and companies operate from year to year, with annual budgets, figures and performance measurements, but this kind of thinking is detrimental to research projects that may take 20 years to come to fruition—still less than the average tree rotation. We need to pull back from annual results and concentrate on long-term planning for R&D; only then can we use it effectively for public education and outreach, and only then will we attract the kind of money we need to move forward. We need to operate in the timeframe of the forest; we need to think like a forest."

Susan Gesner, President, Canadian Forestry Association

Interviewees agreed unanimously that the future health of Canada's forests and forest industry hinges on R&D. And they nearly unanimously agreed that the Canadian forest sector is woefully underinvested in this area.

One forest stakeholder summed up the situation: "All statistics show that the Canadian forest industry invests less money in R&D, both in gross amounts and as a percentage of profit,

Canadian R&D* Expenditures on Forestry 1995-1998 ($ million)



*See glossary for definitions of R&D
Source: Statistics Canada

than its major competitors, especially in Scandinavia." As reported in *The State of Canada's Forests 1998–1999*, the difference is substantial: in 1996, Canada's total investment in forest research was 0.36% of the value of forest products shipped, compared with 1.5% in the United States and 1.75% in Sweden."

Overall, funding for forest R&D in Canada has been dwindling instead of growing during the past few years. Federal research funding, in particular, had been tapering off but, since 1997, has somewhat stabilized. Also, industry has been responding to market downturns in part by withdrawing money from research. It has been a difficult time for research institutes, which have survived on lean budgets, and for corporate research branches, some of which have shut down.

The question of who should lead and fund forest R&D is ever-present in the forest sector. Most of those interviewed felt that joint research by industry and government is the only reasonable approach. It was in this spirit that FORCAST, a national, private coalition of Canada's forest community was recently incorporated. This not-for-profit coalition has, among its many challenges, a goal of ensuring forest S&T in Canada becomes adequately resourced. The organization has also assumed the task of attempting to better align forest S&T with national, provincial and business priorities and objectives which is, in turn, expected to strengthen S&T capability and capacity within Canada's forest sector.

But despite the prevailing notion that Canada does not direct adequate resources to forest S&T, some contend that the real picture is not evident. There are those who feel Canada is not capturing many of the S&T expenditures within the sector and in so doing, misrepresent the true efforts that are being undertaken. One government official noted that discussions are taking place with data collection agencies such as Statistics Canada to correct this situation, with the hope of providing a more accurate annual estimate of S&T expenditures within the sector.

Several spokespersons suggested that Canada find new and better mechanisms for ensuring that money coming out of the forest is reinvested in silvicultural and other research. This could happen through increased stumpage fees, or through a greater proportion of stumpage fees being set aside for research. It could also happen if companies made a concerted effort to direct more money into innovative domestic research instead of using it to buy foreign technology and ideas.

An observation that surfaced during several discussions on R&D was that Canada must devote more scientific know-how to compiling a comprehensive national forest information system, one that accounts for a range of forest attributes. As Canadian forests come under more international scrutiny, and as Canada becomes more immersed in international discussions and strategies involving the forest, it will be more important to have current, standard, reliable information about what the forest contains and what is being derived from it.

THE FUTURE OF THE FOREST INDUSTRY

All of the changes that will shape forest management in the future will also shape forest companies, the on-the-ground managers of most of Canada's accessible forest land. Nonetheless, as one forest representative put it, "Many of the high-level issues ahead for the forest sector will emerge from the market itself."

Observers noted that in the new millennium, offshore forces will drive industry's need to compete and keep prices low. It will be more crucial than ever for Canada to maintain its toehold in the global forest products market, which will mean following market trends, diversifying, and innovating.

Certification

"Certification is happening in Canada even faster than originally anticipated. It is important to have outside parties—individuals, groups and societies—judge what we do with our forests. This causes change and drives progress. The pulp and paper industry has had to make some changes to conform to what outside parties value, and that's fine. In the end, it's good for everybody."

Lise Lachapelle, President and CEO, Canadian Pulp and Paper Association

Nearly everyone interviewed concurred that certification of wood products is no longer a far-off uncertainty—it has arrived. Current statistics support this conclusion. In June 1999, 3.7 million hectares of forest land were certified in Canada. By April 2000, that figure had jumped to about 15 million hectares, which represents close to 12% of Canada's area of managed forests. The Canadian Sustainable Forestry Certification Coalition projects that by the end of 2003, 72 million hectares, or 60% of the forest land under active management, will be certified. *(For more detailed information and discussion on certification, see page 11).*

Adding Value to Forest Products

"What we have in our forests is quality wood from extensive natural forests. Up to now, we have been using our high-quality species for pulp. Maybe it's time to change our thinking so that we use high-quality wood for a great variety of high-quality products. We need to change our markets so that they are more focused on value-added products. Getting more value from our wood would help alleviate future problems of supply."

David Neave, Executive Director, Wildlife Habitat Canada

Most members of the forest community emphasized the importance of increasing the proportion of value-added products in Canada's export mix in the future. Market performance over the last decade has signalled that demand may be waning for some of Canada's traditional commodity products, largely because of offshore competition in these markets. At best, demand for commodity products has always been cyclical, leaving producers highly vulnerable to market swings. As for the future, while all projections point to increased demand for forest products into the 21st century, that demand will not be evenly distributed. The market for softwood lumber and newsprint is expected to increase only moderately, while the market for plywood will in fact drop.

On the other hand, demand for value-added products is expected to grow significantly. Canadian companies that specialize in value-added wood products have already been experiencing this swelling demand, and have been reaping record profits. Many of the people interviewed felt certain that value-added items are the forest products of the future, and stressed that Canada must diversify its exports accordingly. Said one industry representative, "Canada is the world's largest exporter of softwood lumber, but in the area of engineered wood products, our exports and imports come close to balancing each other. It shouldn't be that way. We should be a major exporter of these products as well."

Some pointed out that the shift to adding value will have benefits beyond diversifying Canada's exports; it will also help industry cope with anticipated supply changes, including less supply, lower-quality fibre, and smaller-diameter wood. It will also improve employment in the sector, since value-added production is often more labour-intensive. Moreover, value-added products sometimes have higher profit margins than commodities, often making them less sensitive to economic cycles.

Some individuals clarified that the value-added products with the greatest growth potential are not fine products like furniture and mouldings; they are materials like gluelam, engineered

"The future ability of Canadian firms to access foreign markets may increasingly depend on the knowledge content of products, that is, the amount of scientific information or knowledge embedded in one product compared with another. Increasing the knowledge content of the Canadian product mix will require a more aggressive approach to R&D and to technological innovation by firms together with support and encouragement from governments."

Technological Progress and Competitiveness in the Canadian Forest Products Industry, Canadian Forest Service, 1999 trusses and joists, oriented strandboard, and higher grades of paper. Some described the value-added market as being wide open to innovation, which suggests that some of tomorrow's major forest products could be ideas on the drawing-board today. In many discussions, people linked the future success of value-added products to the need for more dedicated research and technological development in the processing sector. Adding value means adding knowledge, in other words, and Canada must encourage innovation to remain competitive in the future.

Technology in the Forest

"In Finland and Sweden, there is far more proactive use of technology on the production side than we have in Canada, and it's not because the technology isn't known to us or available to us; it's just that for many reasons we have been slow to adopt it."

Joseph Wright, President and CEO, Pulp and Paper Research Institute of Canada

Expansion of Canada's value-added product line is just one development identified by forest representatives as requiring more technology in the forest sector. Changes in forest management, especially the shift to managing and protecting ecosystems, are already necessitating technological innovation. Forest machinery, inventory and mapping systems, forest management tools, and communications technology are all becoming more sophisticated—a necessary adaptation to the growing complexities of managing and operating in Canada's forests.

"The availability of skilled, qualified, and knowledgeable human resources is a necessary condition for innovation. Studies of the forest industry workforce have concluded that there is a skill shortage in the labor force that could potentially affect productivity, product quality, and the receptiveness of firms to technological change. Additionally, a significant gap exists between the scientific and technical training needs of the workforce and the current training capacity. ... Expanded education and training programs are required and they should be funded by both industry and government."

Technological Progress and Competitiveness in the Canadian Forest Products Industry, Canadian Forest Service, 1999

(Many recent and upcoming technological developments in the forest sector were highlighted in *The State of Canada's Forests 1998–1999.*)

Some forest representatives commented that the Canadian forest sector is slower than it should be in adopting and developing advanced technologies, a situation they linked back to insufficient investments in R&D. Right now, more than half of the equipment and machinery used in the Canadian forest products industry is imported, a figure many would like to see drop.

Several individuals zeroed in on the need for more computerized decision-making tools in the future, tools that will help forest managers forecast and simulate the impacts of their decisions. One industry spokesperson noted, "This is the only way to get around the long time involved in field trials. Waiting for trees to grow takes too long. There must be lots of computer-based research to find other ways of modelling experiments."

Future Forest Workers

"The focus on technology will mean we need different knowledge and skill levels in forestry personnel. In Canada, we have always trained our foresters as generalists, but we will increasingly need specialists who have the knowledge to take us forward technologically."

Ken Higginbotham, Vice-President of Forestry and Environment, Canfor Corporation

When talking about the future of forestry personnel, those interviewed repeatedly predicted that workers will need more and different skills to work in the forests of the 21st century. Some connected this need to a growing value-added sector and increased technology in forestry. "If we're going to boost value-added production," said one forest association official, "this doesn't mean making picnic tables in the garage. It means innovating, and that takes educated people who understand new systems, who understand new technology, who can develop the products, applications, and machinery that will advance value-added production."

Some observers connected the need for more skilled personnel to sustainable management and certification, which will increasingly require forest practitioners to demonstrate certain competencies they have historically not needed. In the long term, suggested one forester, widespread certification may well lead to more standardized qualifications, education, and professional designations among Canada's forest workers.

It was also noted that forester practitioners will need to become much more knowledgeable about the science of climate change. Climate change strategies are at the point of moving from the international policy level to the ground level, and it will be up to forest workers to incorporate them into forest management plans and actually carry them out.

Another theme that emerged from discussions was the need to attract more Aboriginal people into the forestry profession. At the moment, according to the Canadian Institute of Forestry, there are only 16 Aboriginal registered professional foresters in Canada, and fewer than 100 registered forest technicians. As one senior forester noted, "As Aboriginal people claim more responsibility for their lands, it will become more important for them to know how to manage their forests. This means having educated forest professionals who can make assessments from a forestry perspective and an Aboriginal perspective."

Publicizing the Value of Forest Products

"In the past, wood has always sold itself. Because of this, the wood industry has not developed much of a relationship with the end user. Now, with growing competition from alternative products, the industry needs to aggressively promote wood for what it is: an environmentally friendly and versatile building material."

Kelly McCloskey, President, Canadian Wood Council

Wood marketing, noted some forest representatives, is an avenue Canada has never followed on a large scale, mainly because it has never needed to. But now, confronted with new competition from other wood-producing nations, and with heavy promotion from producers of non-wood materials like steel, concrete, aluminum, and plastics, the Canadian wood industry is rethinking the importance of strategic marketing.

According to one industry spokesperson, this marketing should begin at home, specifically with convincing Canadian builders that wood is the appropriate choice not just for houses but for community and industrial structures as well. There is growing interest in wood in some regions of the country, including Quebec and British Columbia, for large projects like schools, pools, gymnasiums, and community centres, but this "wood ethic" needs to spread to other parts of the country. Wherever possible, Canadian builders should prefer Canadian wood over imported United States steel or concrete. For this to happen, the industry must publicize the various advantages of wood: its strength and durability, its superior ability to withstand earthquake and hurricane forces, and its low environmental impact.

It is this last attribute that, in the opinion of some, will prove to be wood's biggest selling point in the future. At a time when society is growing ever more conscious of its impact on the environment, and the international community is demanding more reduction of pollution and greenhouse gas emissions, wood is well suited to becoming the material of choice for construction and fabrication. Unlike many of its substitutes, wood is a natural, renewable resource that, when it comes from sustainably managed forests, leaves a minimal impact on the environment. Wood's environmental benefits also stem from the fact that less energy is consumed in producing it than in producing most other building materials. Energy consumption—especially of fossil fuels, by far the most common energy source in North America—has significant repercussions for the environment. A broad survey of architects and engineers in North America recently found that overall, wood was ranked the most environmentally friendly building material.

The environmental benefits of wood may also lead, in the long term, to its wider adoption as a fuel source, even in industrial applications. There is interest in some regions of North America and Europe in substituting wood for fossil fuels to control carbon emissions. For example, as reported in *The State of Canada's Forests 1998–1999*, one city in Sweden has switched to burning wood pellets as its primary energy source.

A final observation that emerged about marketing was its significance for value-added products. A key to satisfying the value-added market, said some, is knowing exactly what the customer wants. This means studying the market carefully, noting the most desired product characteristics, and then creating products that

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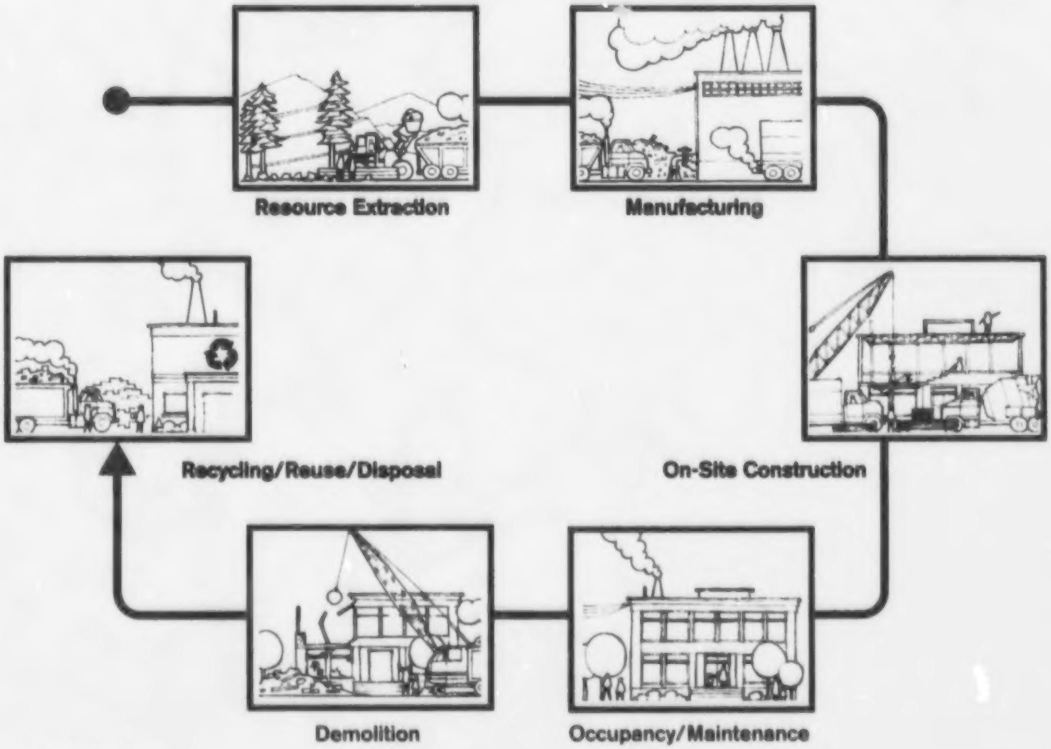
Athena™ is a computer model which assists building designers and researchers in making environmental impact assessments of various building materials from a life-cycle perspective.

Athena™ is the result of a five-year research program involving a unique alliance between architects, environmentalists, academics and engineers. The project was originally co-ordinated by Forintek Canada and supported by Natural Resources Canada. It is now incorporated as a not-for-profit research organization under the banner of the Athena™ Sustainable Materials Institute.

Designers can use the Athena™ model to look at the life cycle environmental effects of a complete structure or of individual assemblies and can experiment with alternative designs and different material mixes to arrive at the best environmental footprint. Manufacturers can use the model to benchmark processes and assess the environmental effects of alternative technologies or production processes. Researchers can use it to better understand the environmental implication of the building sector, including related policies.

For more information on the Athena™ project, visit their web site (http://www.athenasmi.ca).

LIFE CYCLE OF BUILDING PRODUCTS



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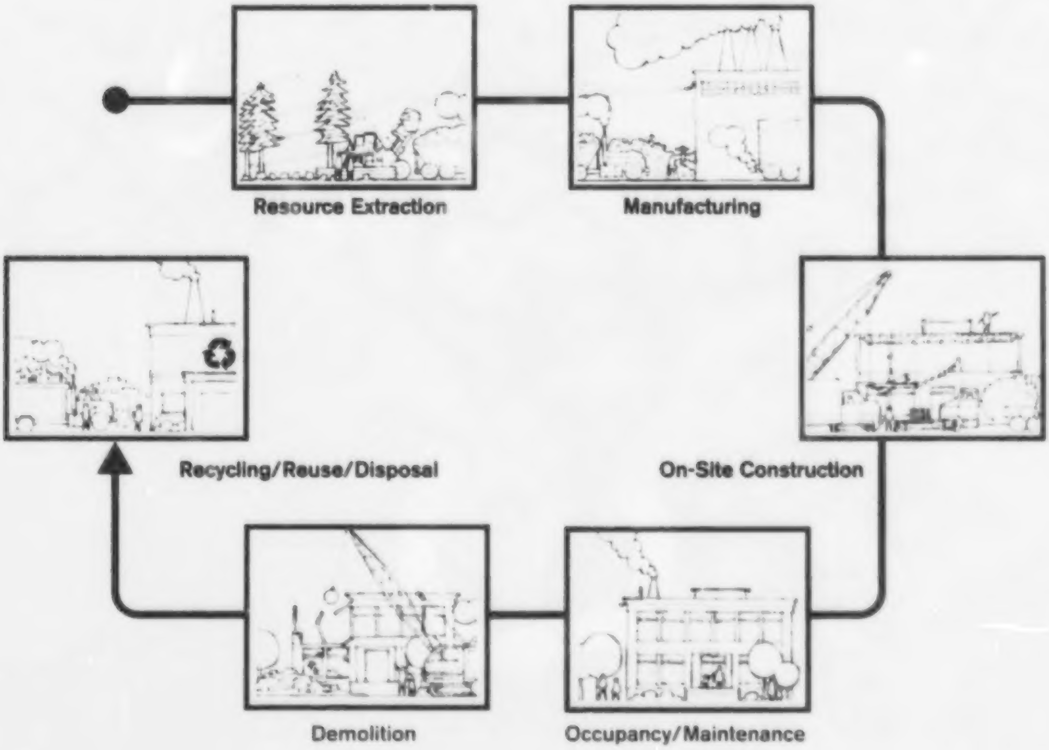


feature exactly those characteristics. Niche markets will become more critical for the value-added sector in the future, noted some observers, and accessing them means improving market research and marketing strategies.

FORESTS AND PEOPLE

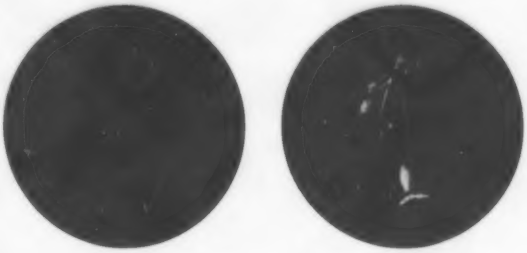
The end of the 20th century in Canada saw more public involvement in forest issues than ever before. Canadians changed how their forests are managed and how they are harvested. They lobbied for and got more species protection and more land base protection. They influenced forest appearance and forest use. They asserted that Canada's forests are worth more than the timber they contain, and pressed for recognition of forests' non-commercial values.

Many in the forest sector believe that public involvement in forest decision-making will only escalate in the future. The individuals interviewed agreed with this view. Indeed, many said this was their hope for the future, declaring that increased public participation and use of the forest will surely benefit the sector in the end.

Leisure and Recreation in the Forest

"Canada's forests in the new millennium will have more recreational and aesthetic value for people. Canada has the potential to become the playground of the world, but much of that potential rests on having scenic, well-treed landscapes."

Andrew Clark, President, New Brunswick Federation of Woodlot Owners



Canadians are a nature-loving people—as confirmed by the 1996 Environment Canada survey that polled Canadians about their leisure and recreational time.

A large number of interviewees predicted that recreational use of the forest will increase significantly in the future. "We live in an increasingly nature-starved world," noted one forest owner, commenting on the growing urbanization of Canada's population. That is one explanation for why more people are choosing to spend their free time in natural surroundings. Another is that more people are retiring early, in their fifties and early sixties, and are still healthy and active enough to take up outdoor hobbies. One environmentalist pointed out that bird-watching, often practised by older Canadians, is one of the fastest-growing leisure pursuits in the country.

In fact, numerous commentators predicted that forest recreation might evolve from a popular pursuit into a thriving industry in its own right. "Ecotourism," a concept that did not even exist 20 years ago, is beginning to flourish as an industry, and Canada, home to some of the most extensive and untouched wilderness in the world, could benefit greatly. Some individuals remarked that European interest in Canada as a tourist destination will undoubtedly intensify in the future, since there is so little wilderness left in Europe. One observer noted that forest recreation and tourism could help diversify the forest sector: "We will likely see tourism become an even greater part of our economy in the future, to the point where some forest owners and companies may even view tourism as part of their operations and include it in their planning and budgets."

Many were quick to point out, however, that the success of forest recreation and tourism depends entirely on the appearance and health of the nation's forests. Keeping forest destinations—those close to populated centres as well as those in the wilderness—aesthetically pleasing and natural-looking will be an important consideration for forest management in the future.

More Community Involvement in Forest Decisions

"We need to become much more focused on communities. Community residents need to benefit more from the forest they live in. The forest industries, and our forest policies, need to support communities. Also, involving the communities is the only way we can be sustainable."

Harry Bombay, Executive Director, National Aboriginal Forestry Association

A point made repeatedly by forest sector representatives was that the voice of forest communities must grow louder in the 21st century. The Canadian public has wielded enormous influence over forest decision-making in the past decade or so, but sometimes the greater public, which is often urban and removed from the forest, has overwhelmed the smaller public, the rural communities of people who live and work and have their roots in the forest.

Among the people interviewed, there was strong support for a greater community role in future forest planning, management, and use. As one forest owner and dweller put it, "The farther you move forest decision-making away from the local level, the worse that decision-making will be for the forests and for the communities." In the end, local communities are the most directly affected by forest decisions, which is why, according to another forest representative, "These communities will increasingly demand the right to articulate their needs and goals for the forest, especially if they depend upon the forest for their livelihood."

Public Communication and Education about Forests

"The main problem in Canada right now is public perception. By and large, Canadians do not realize what forest managers are doing and what they are accomplishing for the public, and this should change. The forest sector doesn't do a good enough job of conveying to Canadians how important forests are, how important the forest industry is to our economy, and how carefully our forests are being managed."

Colin Maxwell, Executive Vice-President, Canadian Wildlife Federation

> "The people of this country must truly examine where they want to go with their forests in the 21st century. Since the glaciers retreated, the forest has been the largest provider of wealth in Canada. For the past century and more, the forest industry has been the country's largest employer and its most important creator of wealth. There is still the option to continue in that position, without in any way diminishing the diversity and vitality of the forests.
>
> "To achieve this option, however, there must be a clear articulation of that vision and the leadership to sustain it through the years to come. That leadership must begin with the people who know and use Canada's forests. Without this vision, and the leadership to realize it, we will miss the opportunity of greatness and relegate ourselves to mediocrity."
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> ***Mike Apsey, Don Laishley, Vidar Nordin and Gilbert Paillé, "The Perpetual Forest: Using Lessons from the Past to Sustain Canada's Forests in the Future"***

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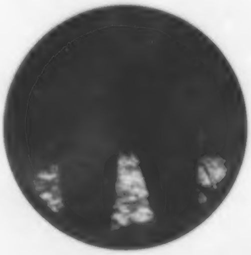
If the Canadian people are to participate more actively and directly in forest issues in the future, it is critical that they receive complete, accurate, and balanced information about their forests—that was the message conveyed in many interviews. Numerous representatives from a variety of forest interest groups lamented that the Canadian public is woefully under-informed, or misinformed, about the state of their forests. These representatives urged that better communication and public education are vital if the public's input into forest policy is to be sound.

The growing urbanization of Canada, said some, will make public education all the more challenging, since more people will be further removed from the forests and will have less first-hand knowledge of them. Urbanization will make public education all the more pressing as well. Because urbanites will make up an even greater part of the population, their perception of forests and forest activities will become even more influential. It is therefore critical that their perceptions be based on facts, not on beliefs or misrepresentations.



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This year the Canadian Forestry Association (CFA) is celebrating its 100th Anniversary and the important role it has played as Canada's oldest conservation organization.

Since its beginning in 1900, the CFA has worked to foster understanding and cooperation in the protection, wise use and sustainable development of Canada's forest, water and wildlife resources. It does this through the promotion of sound forest management practices and programs of public education.

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MAURICIE: CANADA'S FORESTRY CAPITAL

The Mauricie area, one of Quebec's most beautiful forestry regions, is currently preparing for its role as *Canada's Forestry Capital*, a title it will hold throughout the year 2001. The title is conferred every year on an outstanding forestry region that has been able, over the years, to excel in every aspect of forestry, and in which forestry is an important tool for everyday socio-economic development.

Northwest Ontario is the 2000 Forestry Capital of Canada.

If the Canadian people are to participate more actively and directly in forest issues in the future, it is critical that they receive complete, accurate, and balanced information about their forests—that was the message conveyed in many interviews. Numerous representatives from a variety of forest interest groups lamented that the Canadian public is woefully under-informed, or misinformed, about the state of their forests. These representatives urged that better communication and public education are vital if the public's input into forest policy is to be sound.

The growing urbanization of Canada, said some, will make public education all the more challenging, since more people will be further removed from the forests and will have less first-hand knowledge of them. Urbanization will make public education all the more pressing as well. Because urbanites will make up an even greater part of the population, their perception of forests and forest activities will become even more influential. It is therefore critical that their perceptions be based on facts, not on beliefs or misrepresentations.

SPECIAL Articles

CRITERIA AND INDICATORS OF SUSTAINABLE FOREST MANAGEMENT:

International to Local Level Initiatives

Criteria and indicators (C&I) are tools for assessing trends in forest condition and for providing a basis for policy development aimed at promoting sustainable forest management. Criteria are a set of values that characterize forest condition. Indicators are measurable attributes or aspects of criteria. Repeated measurement of indicators can be used to describe trends and chart change over time.

Canada is addressing C&I of sustainable forest management at various levels, ranging from those at the international level, to national-level initiatives, to sub-national (or regional) undertakings, and ultimately at the local level. For the purpose of this report, international C&I activities are those associated with the Montréal Process, in which the C&I of sustainable forest management are being addressed at the global temperate and boreal forest level. Canada's national C&I initiatives are those agreed to and being implemented nation-wide by the Canadian Council of Forest Ministers (CCFM)—the 14 federal, provincial and territorial ministers responsible for forests. Sub-national C&I initiatives are those at the individual provincial/territorial levels. Local level indicators are those under development and testing in localized forest areas within individual provinces/territories—generally within model forests.

C&I at the international level

The concept of using C&I to measure and track the sustainable development of forests has flourished. Globally, there are at least 140 countries currently participating in C&I initiatives at various levels and in various ecosystems.

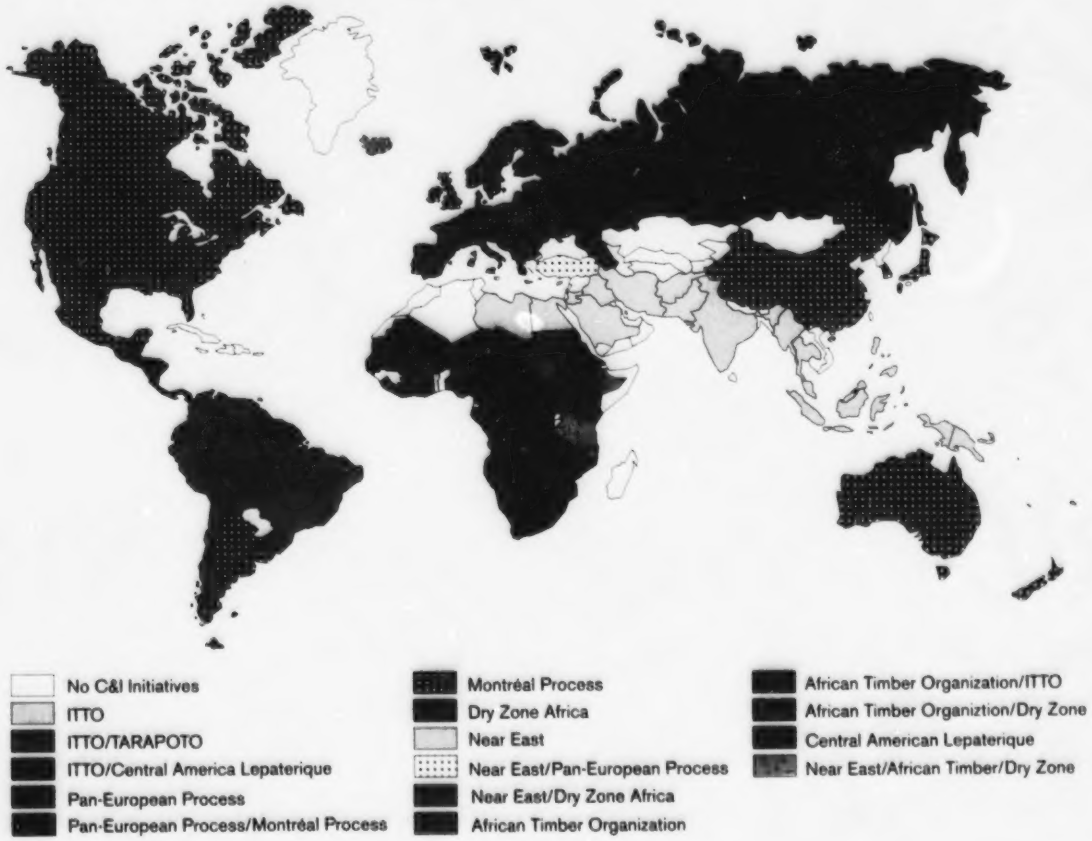
Canada is a participant in the Montréal Process, an international C&I initiative aimed at ensuring the sustainability of, principally, the world's temperate and boreal forests.

The 1992 Rio Earth Summit recognized the importance of forests to sustainable development when world leaders adopted the Statement of Forest Principles and Agenda 21—an international action plan. Governments and non-government organizations acknowledged the need to develop a common understanding of what is meant by sustainable forest management and how to achieve it.

Subsequently, the Conference on Security and Co-operation in Europe sponsored a Seminar of Experts on Sustainable Development of Temperate and Boreal Forests in Montréal, in September 1993. The intent was to continue the work of the Rio Earth Summit through discussions on sustainable forestry and measurable C&I. As a result of the interest generated by this event, the Montréal Process Working Group was formed. Its first meeting took place in 1994 in Geneva, Switzerland.

Canada hosted the fourth meeting of the Working Group and has been providing the Liaison Office for the Montréal Process since its inception.

REGIONAL AND INTERNATIONAL INITIATIVES
on C&I for Sustainable Forest Management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Pan-European Process
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Montréal Process
Dry Zone Africa
Near East
Near East/Pan-European Process
Near East/Dry Zone Africa
African Timber Organization
African Timber Organization/ITTO
African Timber Organiztion/Dry Zone
Central American Lepaterique
Near East/African Timber/Dry Zone

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1. Conservation of biological diversity	9
2. Maintenance of productive capacity of forest ecosystem	5
3. Maintenance of forest ecosystem health	3
4. Conservation and maintenance of soil and water resources	8
5. Maintenance of forest contribution to global carbon cycles	3
6. Maintenance and enhancement of long term multiple socioeconomic benefits to meet the needs of society	19
7. Legal, institutional and economic framework for forest conservation and sustainable management	20

The Montréal Process Working Group currently has 12 members: Argentina, Australia, Canada, Chile, China, Japan, Korea, Mexico, New Zealand, Russia, Uruguay and USA. At its sixth meeting, held in Santiago, Chile in 1995, the Working Group agreed upon a set of 7 criteria and 67 indicators for the conservation and sustainable management of temperate and boreal forests. Member countries are working together to implement and report on the C&I that they have agreed characterize key values of sustainable forest management and provide for measuring progress on protecting and enhancing these values. This international process also provides a reference for countries to develop domestic policies to conserve and manage a wide array of forest values. Each member has developed its own approach to implementing Montréal Process C&I and a report was released in April 2000 highlighting member countries' accomplishments toward this end.

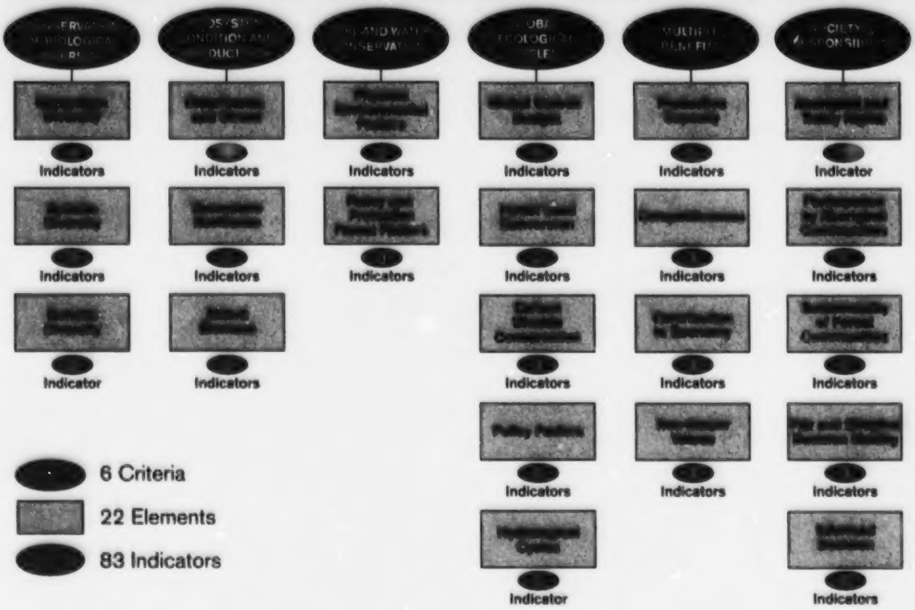
Canada's national C&I initiative

In 1992, shortly before the Rio Earth Summit and following two years of consultations with the Canadian public and the forest community, the CCFM released a national strategy entitled *Sustainable Forests: A Canadian Commitment.* This strategy, endorsed by the forest community including non-government organizations and industry, described a common vision and a five-year plan for the management of Canada's forests for both timber and non-timber values while protecting the integrity, health and diversity of forest ecosystems. One of the strategy's 96 commitments was for the development of a set of national indicators to measure forest condition and to track Canada's progress toward sustainable forest management.

In 1993, the CCFM created a Task Force and launched a public consultation process to develop a framework of science-based C&I. These efforts led to the 1995 publication of *Defining Sustainable Forest Management: A Canadian Approach to Criteria and Indicators,* in which the C&I framework was presented, providing a reference point for the development of Canadian policies on the conservation, management and sustainable development of forests. These C&I also provide a tool for facilitating international dialogues on sustainable forest management.

In 1997, the CCFM released *Criteria and Indicators of Sustainable Forest Management in Canada,* a technical report that outlined the country's capacity to report on the C&I contained in the framework. The following year, Canada reaffirmed its commitment to

CCFM CRITERIA AND INDICATORS FRAMEWORK



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C&I at the regional level

In concert with the CCFM C&I initiative, and in recognition of the diversity of forests and other factors across the country, several Canadian provinces have adopted their own C&I for sustainable forest management. In fact, some have incorporated C&I into their forest management planning and even into their forest legislation. Quebec, for example, has developed a framework of 60 indicators. Ontario has also drafted a comprehensive set of indicators which it, too, plans to integrate into its forest legislation and policies. In Newfoundland and Labrador, the government is drafting a 20-year forestry development plan that will contain specific references to a provincial set of C&I, and it is considering integrating the indicators into legislation. Saskatchewan is developing indicators for forest ecosystem health, while New Brunswick has developed a vision document for its forests that provides a framework for forest management and sets out policy goals and explicit standards and objectives to be used in the development of forest management plans on Crown Timber Licences.

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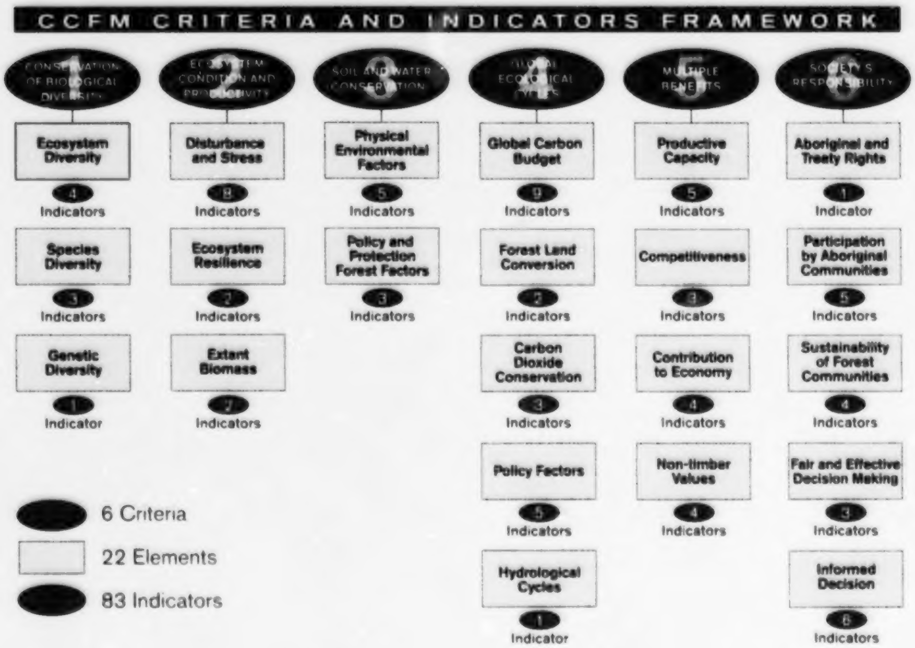

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Local level indicators: model forests as testing grounds

The Canadian Model Forest Program was established in 1992 by Natural Resources Canada—Canadian Forest Service and now comprises 11 model forests representing the diversity and complexity of each major forest region of Canada. In part, model forests are focused on the establishment of processes for developing, testing, applying and monitoring local level indicators of sustainable forest management.

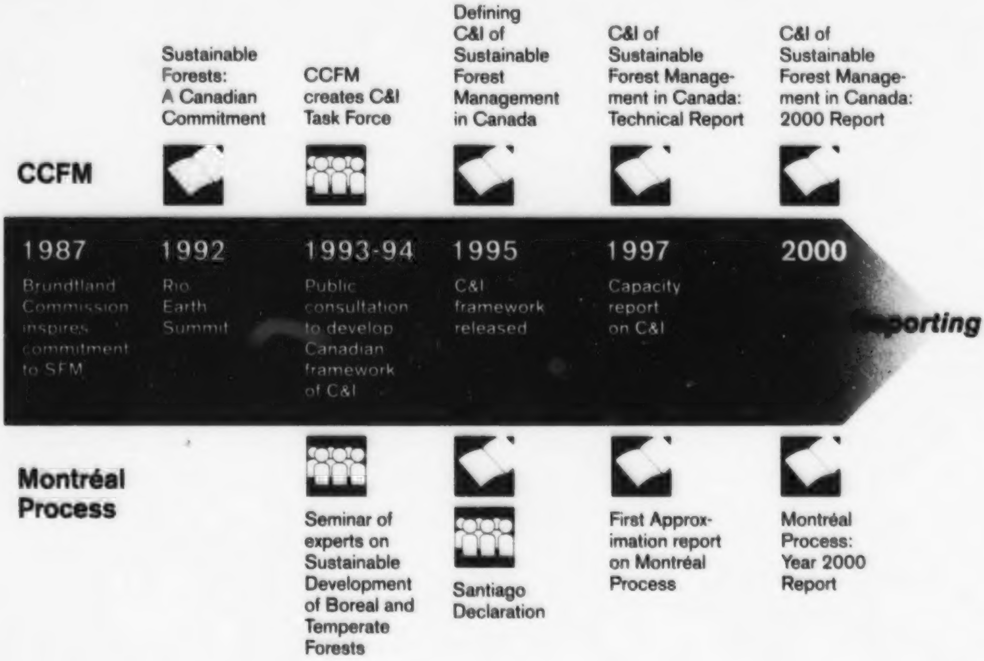
While the CCFM-developed C&I focus on measuring progress at the national level, the primary use of local level indicators is measuring local level progress toward the achievement of sustainable forest management. A good set of indicators, well matched to the scale of interest, with up-to-date data as well as past trend data, is recognized as a tremendously useful planning tool for resource managers and decision makers.

Each model forest has utilized the criteria from the CCFM framework, recognizing them as a widely accepted description of sustainable forest management and as a logical starting point for the development of local level indicators. Now, each model forest has finalized a set of local level indicators suited to its particular socioeconomic, cultural and ecological conditions.

The Western Newfoundland Model Forest, for example, has produced a *Practical Guide to Criteria and Indicators* to help resource managers ensure the maintenance of healthy forests able to support the broadest possible range of values. The guide outlines a process for monitoring forest condition and the impacts of forestry and other activities. This will allow resource managers, interested parties and society as a whole to clearly see where progress is being made and where improvements are required.

Along this same line, the Eastern Ontario Model Forest released its 1998-1999 *State of the Forest Report for Eastern Ontario* in which it describes the health of the region's forests. The report presents information on 6 criteria and 18 local level indicators—again covering a range of environmental, sociocultural and economic values.

Historical Overview of Canada's Participation in C&I


Sustainable Forests: A Canadian Commitment
CCFM creates C&I Task Force
Defining C&I of Sustainable Forest Management in Canada
C&I of Sustainable Forest Management in Canada: Technical Report
C&I of Sustainable Forest Management in Canada: 2000 Report
CCFM
1987
Brundtland Commission inspires commitment to SFM
1992
Rio Earth Summit
1993-94
Public consultation to develop Canadian framework of C&I
1995
C&I framework released
1997
Capacity report on C&I
2000
porting
Montréal Process
Seminar of experts on Sustainable Development of Boreal and Temperate Forests
Santiago Declaration
First Approximation report on Montréal Process
Montréal Process: Year 2000 Report

SUSTAINABLE FORESTS GLOBALLY:

Another Step Closer

Forest issues transcend political and sectoral boundaries. They are interconnected with policies on the environment, agriculture, trade, energy, science and technology, economic growth, and development assistance. Some of these issues can be resolved at home while others require international action.

Human needs, cultural activities, and socioeconomic priorities vary widely between countries and communities. In addition, since forest types vary greatly throughout the world, definitions of sustainable forestry are at least as numerous as the forest types to which they apply.

Agreement on what constitutes "sustainable forest management" can be reached only if there is a common understanding of the issues and objectives. For these reasons, Canada is continuing to promote the need for an international legally binding agreement or instrument on forests, such as a convention on forests, as the best means of dealing with global sustainable forest management in a comprehensive and balanced way.

Following the United Nations Conference on Environment and Development (UNCED) in 1992, the international dialogue on forest policy issues resumed in earnest with the establishment of the Intergovernmental Panel on Forests (IPF) in 1995 and with its successor, the Intergovernmental Forum on Forests (IFF) in 1997.

At the heart of discussions, especially in the later stages of the IFF, was the need to reach agreement on future international arrangements and mechanisms for forests that would provide resolutions to key issues such as resources, including financial, to support sustainable forest management and technology transfer. While momentum was building in favour of a legally binding instrument for forests, it was not evident that global consensus on future directions would emerge by the end of the IFF's mandate unless there were focused discussions.

With this in mind, and to support the work of the IFF, the Governments of Canada and Costa Rica, with the support of 20 other countries and international organizations, sponsored a series of technical meetings intended to focus discussions on possible future arrangements. The Costa Rica–Canada Initiative (CRCI) provided a neutral and participatory forum attended by 59 governments, 11 intergovernmental institutions, 8 Indigenous groups and 23 non-government organizations, including environmental groups, women's groups and industry. Two international and eight regional meetings took place between February and December 1999.

Three options for possible future directions were proposed through the CRCI: strengthening existing legally binding instruments; developing new legally binding instruments; and using current non-legally binding instruments and initiatives. The final CRCI meeting, held in Ottawa, was intended to solidify understanding of the strengths and weaknesses of each of these three proposed options. As a result of the Ottawa meeting, a report was prepared with the intent of providing the basis for making informed decisions on these issues, and subsequently was submitted to the fourth meeting of the IFF in February 2000.

Given that experts participated in CRCI discussions in their personal capacity, the report reflected the range of views expressed, rather than consensus. Broad areas of agreement did, however, emerge. For example, it was generally felt that forest issues are not adequately addressed in current arrangements and that further action was required to improve the state of the world's forests. It was also agreed that the process should end at the fourth IFF meeting with a clear decision on new future international arrangements and mechanisms and that these should provide a permanent, action-oriented approach to the global forest policy dialogue—one that has legal authority and political commitment.

CRCI participants have expressed their appreciation for the extent to which the regional meetings raised the awareness of global forest issues and increased the involvement of many who would not have otherwise had the opportunity to learn about and participate in the dialogue. Participants were also appreciative of the frank exchange of information and views which allowed them to take stock of the options available and to identify areas of agreement.

COSTA RICA – CANADA

Although it was recognized that the CRCI had accomplished its objectives, final negotiations at the fourth and final session of the IFF on future international arrangements and mechanisms proved difficult. After marathon discussions, consensus was reached by recommending the following to the Economic and Social Council (ECOSOC) and the United Nations General Assembly (UNGA):

"a) establish an intergovernmental body called the UN Forum on Forests (UNFF) whose mandate would be to facilitate the implementation of the large number of proposals for action agreed to in the IFF process and its predecessor IPF;

b) invite heads of UN and other international and regional organizations involved in forest issues to form a collaborative partnership on forests to support the UNFF's work and enhance cooperation and co-ordination among participants;

c) within 5 years, on the basis of the assessment of progress on sustainable forest management at national, regional and international levels, consider, with a view to recommending, the parameters of a mandate for developing a legal framework on all types of forests; and

d) take steps to devise approaches towards appropriate financial and technology transfer support to enable the implementation of sustainable forest management.”

While Canada and most other countries sought clearer language to initiate negotiations on a legally binding instrument more quickly, a few countries remained adamantly opposed, thereby blocking the emerging consensus.

The Commission on Sustainable Development (CSD), during its eighth session in April 2000, endorsed the CRCI report and the recommendations of the IFF and invited the ECOSOC and UNGA to take action on the proposed international arrangement on forests.

When the ECOSOC meets in July 2000, it will address issues related to the mandate of the new UNFF, its methods of operation and its reporting relationship within the UN system.

Canada will continue to participate in international discussions on forests. Moreover, to demonstrate its commitment to implementing the IPF/IFF proposals for action, Canada intends to prepare a status report for the first meeting of the UNFF, which will likely occur in early 2001. Canada will also continue to work with the growing number of countries who are pressing for negotiations to begin on a legally binding instrument on forests.

Species at Risk

he *State of Canada's Forests* provides an annual listing of forest-dependent species at risk, including descriptions of new species added to the list during the reporting year. As of May 2000, there are 353 species of which 85 are forest-dependent, classified as being at risk in Canada.

A NEW CANADIAN STRATEGY

In 1992, Canada became the first industrialized country to ratify the United Nations Convention on Biological Diversity. In doing so, Canada committed itself to "Develop or maintain necessary legislation and/or regulatory provisions for the protection of threatened species and populations." To fulfill this commitment, Canada has been working toward an improved protective framework for species at risk.

In 1996, the Government of Canada joined with provinces and territories in supporting the Accord for the Protection of Species at Risk, which committed all of Canada's jurisdictions to "establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada." Since then, six provinces and territories have introduced new or improved endangered species legislation, in addition to four provinces that already had legislation.

Federal legislation on species at risk is the next step. In the October 1999 Speech from the Throne, the federal government committed itself to bringing in a new Species at Risk Act (SARA) as one of its first environmental priorities for the new millennium. Under the proposed SARA, which was tabled in Parliament on April 11, 2000, key elements of species conservation will be covered, including identifying species at risk, ensuring species are protected both through voluntary actions and legislation, ensuring long-term recovery plans for species restoration and survival, and ensuring species have the space they need to live. Everything contained in the legislation would follow from these basic concepts.

Canadians have been engaged in extensive consultations during the development of this new approach to protecting species at risk. This new strategy, which includes

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UNDER SARA, COSEWIC SPECIES AT RISK WOULD BE LISTED IN SEVERAL DIFFERENT CATEGORIES:

Special concern: a species with characteristics that ma
it particularly vulnerable to human activities or natural events.

Threatened: a species likely to become endangered if limiting factors are not reversed.

Endangered: a species facing imminent extirpation or extinction.

Extirpated: a species no longer existing in the wild in Cana
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COSEWIC's list of designations
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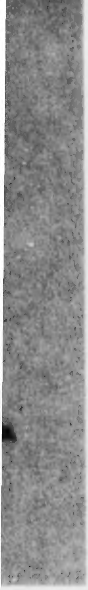

providing assistance to help Canadians take voluntary actions to protect species, also provides the government with the tools to ensure that threatened or endangered species are protected in Canada, no matter where they live. Fairness and pragmatism, as well as respect for the roles of provincial and territorial jurisdictions, private landowners, land users and Aboriginal peoples, are all factored into the new strategy. Mandatory measures would be used only where other efforts fail. This balanced approach is believed to be the most sustainable, sensible and effective for the protection of species and their habitats.

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Also under the proposed SARA, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) would continue to assess, identify and classify species at risk. Basing their assessments on science and traditional and local knowledge, COSEWIC would also continue to compile an annual listing indicating species that are of special concern, threatened, endangered, extirpated or extinct.

To ensure the objectivity of their listing process, COSEWIC has resolved to adopt existing International Union of Conservation Network (IUCN) criteria as guidelines to be used in conjunction with their existing category definitions.

COSEWIC, however, does not use the same category names as the IUCN. COSEWIC's "endangered" category is equivalent to the IUCN's "critically endangered" and "endangered" categories. COSEWIC's "threatened" category is equivalent to IUCN's "vulnerable" category. The COSEWIC category formerly called "vulnerable" is now called "special concern" and equates generally with IUCN's "lower risk" category. COSEWIC has changed the name of its category "indeterminate" to "data deficient", the same name used by the IUCN.

COSEWIC's list of designations will be submitted to the Canadian Endangered Species Conservation Council for recommendation to the Governor in Council for legal listing under SARA.

COSEWIC has begun reassessing already-listed endangered and threatened species against the new IUCN/COSEWIC criteria. This task is being undertaken to ensure that affected species are added to the proposed new SARA, thereby benefiting from all other provisions of the proposed Act. It is expected that the reassessment process will be completed over the next year. In addition, COSEWIC will continue to consider new species in order of priority of those suspected of being most at risk. This task is seen as necessary to bring the status assessments up to date in anticipation of the proclamation of SARA, so that these species can benefit from the provisions of the proposed Act.

FOREST-DEPENDENT SPECIES AT RISK

COSEWIC released the updated list of Canadian Species at Risk following its annual meeting in May 2000. New listings included the interior British Columbia population of the Tailed Frog, a forest-dependent species, and the Tubercled Spike-Rush, a Coastal Plain plant species found only in a small number of unique wetland habitats in Nova Scotia. COSEWIC also reassessed 123 species during the past year. Among these reassessments were populations of another forest-dependent species, the Woodland Caribou.

Criteria for forest dependence includes whether a species requires forests for food, shelter, breeding or other critical aspects of its life cycle.

A comprehensive listing of all species can be found on the COSEWIC Internet site (http://www.cosewic.gc.ca).

COSEWIC will meet again in November 2000 to continue reassessments, plus assessments deferred from May and a number of new reports.

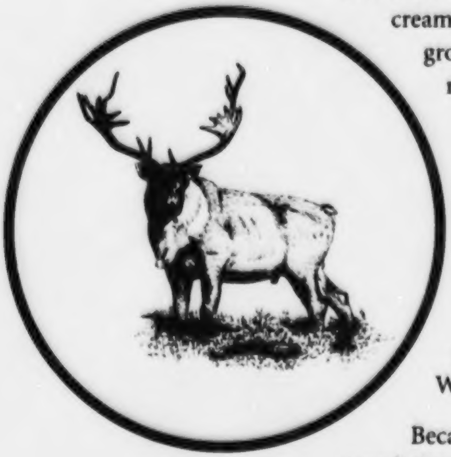
Tailed Frog *(Ascaphus true)*

Tailed frogs are found along the coast and in pockets of interior British Columbia (Southern Mountain population), in western Washington and Oregon, and the north-west corner of California. They live in and near rock-strewn mountain streams that have cold, fast-flowing water. This primitive family of frogs, which are particularly recognizable due to their small size (up to 5 cm from tip of snout to tip of tail) are mostly nocturnal, and feed on insects and worms both on land and in the water. They are also recognizable by their vertical pupils, their non-visible eardrums and the small bumps on their skin, called tubercles. Tailed frogs make no known sounds. Adults generally remain in streams but can be seen hopping about on wet forest floors in search of food.

The tailed frog has a "tail", although not a true tail since the cloaca opening is located at the tip of the tail, which is used to internally fertilize its eggs. It also has muscles to wag the "tail". The tadpoles, which hatch in late August, are easily identified by the white spot at the tip of their tails. Tadpoles require 2-3 years to develop into frogs, which will not breed until they mature at 7-8 years of age. Due to this long maturation period, tailed frog populations are particularly vulnerable to habitat disturbances. The coast population of the tailed frog is listed as a species of special concern, and the Southern Mountain population is listed as endangered.

Woodland Caribou

The Woodland Caribou is found in mature forests containing large quantities of lichen, and in marshes, bogs, lakes, and river regions in northern and coastal parts of several Canadian provinces. The species is well adapted to an Arctic environment, with a large blunt muzzle, short wide ears and a small tail which are all covered with thick fur. The compact body is covered with a thick and long coat (thicker in winter than summer) and the large feet have crescent-shaped hooves that are adapted to walking in snow-covered or swampy environments and change shape with the season. The Woodland Caribou's coat is mostly brown in summer, becoming greyer in winter, with patches of creamy white. Both sexes generally have antlers. On the males these grow so quickly each year that velvety lumps in March can become a rack measuring more than a metre in length by August. Females mature at 16 months, males at 18-20 months, but males usually don't breed before three or four years of age due to the hierarchical structure of the herd and competition between males. Their reproduction rate is low. Breeding occurs at the end of September and the beginning of October and the young are born in mid-June. Destruction of habitat, hunting and disturbances caused by humans during the construction of roads and pipelines are all factors that have contributed to the decline of Woodland Caribou.



Because the Woodland Caribou has a wide range across Canada, populations have been listed in various categories of risk. The Southern Mountain (Alberta and British Columbia) and Boreal (Alberta, British Columbia, Manitoba, Newfoundland, Ontario, Quebec, Saskatchewan and Yukon) populations are listed as threatened. The Atlantic-Gaspésie population (Quebec) is listed as endangered. The Queen Charlotte Islands population is extinct. The Newfoundland and Northern Mountain (British Columbia, Northwest Territories and Yukon) populations have been assessed, but are not considered to be at risk.

FOREST-DEPENDENT SPECIES AT RISK

MAMMALS	BIRDS	PLANTS	REPTILES	
American marten *(NF*)*	Acadian flycatcher *(ON)*	American ginseng *(ON, QC)*	Blue racer (snake) *(ON)*	**ENDANGERED**
Vancouver Island marmot *(BC)*	Kirtland's warbler *(ON)*	Blunt-lobed woodsia *(ON, QC)*	**Tailed frog**** *(BC)*	
Wolverine *(QC, NF, Labrador)*	Northern spotted owl *(BC)*	Cucumber tree *(ON)*		
Woodland caribou *(QC)*	Prothonotary warbler *(ON)*	Deltoid balsamroot *(BC)*		
		Drooping trillium *(ON)*		
		Few-flowered club rush *(ON)*		
		Heart-leaved plantain *(ON)*		
		Large whorled pogonia *(ON)*		
		Nodding pogonia *(ON)*		
		Prairie lupine *(BC)*		
		Purple twayblade *(ON)*		
		Red mulberry *(ON)*		
		Seaside centipede lichen *(BC)*		
		Small whorled pogonia *(ON)*		
		Spotted wintergreen *(ON)*		
		Wood poppy *(ON)*		
Pallid bat *(BC)*	Hooded warbler *(ON)*	American chestnut *(ON)*	Black rat snake *(ON)*	**THREATENED**
Wood bison *(AB, BC, NT, YT)*	Marbled murrelet *(BC)*	Bird's-foot violet *(ON)*	Blanding's turtle *(NS)*	
	White-headed woodpecker *(BC)*	Blue ash *(ON)*	Eastern Massasauga rattlesnake *(ON)*	
	Yellow-breasted chat *(BC)*	Deerberry *(ON)*		
		Goldenseal *(ON)*		
		Kentucky coffee tree *(ON)*		
		Phantom orchid *(BC)*		
		Round-leaved greenbrier *(ON)*		
		White wood aster *(ON, QC)*		
		White-top aster *(BC)*		
		Yellow montane violet *(BC)*		
Ermine *(BC)*	Bicknell's thrush *(NB, NS, QC)*	American columbo *(ON)*	Cœur d'Alène salamander *(BC)*	**SPECIAL CONCERN**
Fringed myotis (bat) *(BC)*	Cerulean warbler *(ON, QC)*	Broad beech fern *(ON, QC)*	Five-lined skink*(ON)*	
Gaspé shrew *(NB, NS, QC)*	Flammulated Owl*(BC)*	Coastal wood fern *(BC)*	Mountain dusky salamander *(QC)*	
Grizzly bear *(AB, BC, NT, YT, NU)*	Lewis' woodpecker *(BC)*	Crooked-stemmed aster *(ON)*	Northern red-legged frog *(BC)*	
Keen's long-eared bat *(BC)*	Louisiana waterthrush *(ON, QC)*	Cryptic paw lichen *(BC)*	Pacific giant salamander *(BC)*	
Mountain beaver *(BC)*	Queen Charlotte goshawk *(BC)*	Dwarf hackberry *(ON)*	Wood turtle *(NB, NS, ON, QC)*	
Nuttall's cottontail *(BC)*	Red-headed woodpecker *(MB, ON, QC, SK)*	False rue-anemone *(ON)*		
Southern flying squirrel *(NB, NS, ON, QC)*	Yellow-breasted chat *(ON)*	Green dragon *(ON, QC)*		
Spotted bat *(BC)*		Hop tree *(ON, QC)*		
Wolverine *(AB, BC, MB, NT, ON, SK, YT, NU)*		Oldgrowth specklebelly lichen *(BC)*		
Woodland caribou *(AB, BC, MB, NT, ON, SK)*		Seaside bone lichen *(BC)*		
Woodland vole *(ON, QC)*		Shumard oak *(ON)*		
		Wild hyacinth *(ON)*		

Population ******species added to the list in 2000***

Source: Committee on the Status of Endangered Wildlife in Canada (COSEWIC)

NATIONAL CLIMATE CHANGE Process

n December 1997, the international community, including Canada, adopted the Kyoto Protocol (the Protocol) to the United Nations Framework Convention on Climate Change (UNFCCC). Under the Protocol, Canada agreed to reduce its greenhouse gas emissions to 6% below 1990 levels by 2008-2012.

Many details of the Protocol remain to be clarified and international negotiations in that respect have been ongoing since 1998. It is expected that significant refinements will be made to the Protocol at the Sixth Conference of the Parties to the Framework Convention in November 2000. If the Protocol goes into force it will become a legally binding agreement after it has been ratified by at least 55 parties to the Convention, including developed countries representing at least 55% of the total 1990 greenhouse gas emissions from this group.

By the 2008-2012 period, Canada's population and the size of its economy, and thus greenhouse gas emissions, will have grown significantly compared to 1990. In order to meet our 6% target, greenhouse gas emissions will need to be reduced by about 25% from currently projected 2008-12 levels.

With nearly half of Canada's landmass being forested, few segments of Canadian society are more intricately linked to the climate change issue than the forest sector. Climate change may have an impact on the growth rates of our forests as well as affecting the range of forest tree species and possibly the severity of natural disturbances such as fire and forest pest infestations. In addition, the UNFCCC and the Protocol recognize that forests can store (sequester) carbon. They also recognize that forests can act as carbon sinks by absorbing carbon dioxide from the atmosphere through the photosynthetic process.

In early 1998, Canada's federal, provincial and territorial ministers of energy and environment approved a process to examine the impacts, costs and benefits of addressing climate change in response to the Protocol. The Ministers also approved the creation of a National Climate Change Secretariat to oversee the development of a national implementation strategy to meet the Protocol target. Sixteen committees, or Issue Tables/Working Groups, were formed and included a cross-section of over 450 experts whose task it was to develop options for reducing greenhouse gas emissions or sequestering carbon.

A number of Issues Tables/Working Groups had some relevance for the forest sector, especially the Sinks Table and Forest Sector Table which worked on the identification of opportunities for enhanced carbon sequestration in forests. The Forest Sector Table also evaluated the potential for the forest sector to help reduce Canada's greenhouse gas emissions. While the forest industry has already made significant strides in reducing its energy-related greenhouse gas emissions, the Forest Sector Table believes that considerably more may be possible. This Table found that there are significant opportunities for Canada's forest sector to reduce emissions primarily through fuel-switching and improved fuel efficiency.

The options reports of the various Tables, including that of the Forest Sector Table, are now available on the National Climate Change Process website (http://www.nccp.ca). Over the next few months, Canada's ministers of energy and environment will consider what options to recommend as part of Canada's national implementation strategy and what further work will be required to assess possible future options.

IMPROVING CANADA'S FORESTS:

A Look at Tree Breeding and Genetics

Approximately 1 million hectares of forest are harvested in Canada annually. Although many of these harvested areas regenerate naturally, on average approximately 470 000 hectares of forest are replanted or seeded in Canada each year.

Planted and seeded forests require significant, long-term labor and monetary investments. To protect these investments and to ensure rapid and successful establishment, vigorous and pest-tolerant tree species have to be used. Further, once the new tree stands are established they must be protected against the ravage of diseases and insect pests, as well as fire.

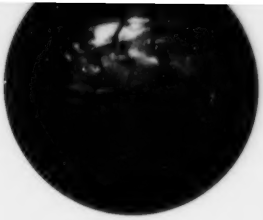
Canada has made great strides in its research and development efforts to increase the vigor and growth rate of harvestable trees, to improve their wood quality and to protect them from diseases and insects through the use of means more environmentally-acceptable than synthetic chemical controls.

Using nature's best

Traditional tree breeding methods have been used in many countries for years now. These methods take advantage of natural pollination processes to gradually produce better quality trees with the most desirable traits, such as being exceptionally fast growing, having a high wood quality, and/or having an apparent resistance to disease and insect attack, to name a few.

A naturally-occurring tree that shows superior qualities is commonly referred to as a "plus tree". Historically, stands of these plus trees have been managed so that only the best are kept as sources of seed. Such a stand is called a "seed stand". But these seed stands generally contain a relatively small number of trees and thus the amount of seed that can be collected from them is limited. To help increase the amount of available plus tree seeds, tree breeders have established hundreds of hectares of "seed orchards" across Canada in which large numbers of plus trees for about 20 commercial tree species are grown.

Trees produce flowers which, in turn, produce pollen. Pollen is spread from flower to flower by such natural mechanisms as wind and insects. This pollen carries the genetic material which determines a tree's qualities. When plus trees in a seed orchard cross-pollinate, they generally produce offspring (progeny) with more desirable traits than would be found in an average natural stand. This occurs because in the seed orchard environment only pollen from plus trees is mixing and there is minimal infiltration of pollen from surrounding, less desirable trees that could take away from the qualities for which these plus trees were initially chosen.



Seeds from the offspring of these seed orchard-grown plus trees are being used to produce seedlings for replanting harvested forest areas that may not adequately regenerate naturally. Roughly 50 percent of the seeds and seedlings used for regeneration of harvested forest lands in Canada are derived from plus tree parents.

Plus trees can also be reproduced from cuttings. This technique is called vegetative propagation and it is an age-old method of producing new plants from existing ones—gardeners frequently use this method to propagate roses and other flowers and shrubs. The advantage of this method is that it can be used to produce an unlimited number of offspring with the same superior qualities from the very best plus tress. It is, however, a labor intensive and relatively slow process, and usually only works when cuttings are taken from young stock—for spruces, from trees five years old or younger, for example.

Canada has been a pioneer in developing ways of producing seedlings more quickly from nature's own plus trees. A type of cloning technique, called somatic embryogenesis, makes it possible to produce an unlimited number of genetically identical seedlings from a single seed of a plus tree in a matter of months. Simplified, somatic embryogenesis is a technique by which plant embryos are produced, in a Petri dish, from a single cell taken from a plant seed. These embryos are eventually developed, in a greenhouse, into seedlings that are genetically-identical. The pitfall of this technique is that almost every species of tree responds to the somatic embryogenesis technique differently—for example, the technique that works for spruce will not necessarily work for pine. Therefore, a somatic embryogenesis technique has to be developed for each tree species. Somatic embryogenesis techniques have been developed and used successfully for larch and spruces and the technology is being developed for pines and firs.

Selecting the best genes

Genes are inherited materials that contain the code that determines the traits in an organism. For trees, physical traits such as size, shape, leaf colour and wood fibre quality, to name a few, are all determined by information contained in genes. Genetic modification—the removal or addition of specific genes in an organism, or the transferring of genes from one organism to another—occurs in nature, but it can also be accomplished in a laboratory. Using controlled genetic modification techniques in the laboratory, as opposed to waiting for similar yet random natural processes to occur in the wild, allows scientists to quickly see the results of unique gene combinations.

Genetic modification is a biotechnology tool that scientists have had at their disposal for more than twenty years. This revolutionary technique has more recently been refined for trees—especially for species such as spruce, pine and poplar—to develop improved physical qualities as well as plant defence systems, particularly resistance to fungal diseases like grey mould, white pine blister rust and leaf rust. Without the advantages of genetic modification, it would take decades, using traditional tree breeding methods, to develop and make copies of trees with these same qualities. Traditional tree breeding is a less specific approach since random combinations of numerous genes generally occur and scientists cannot always be certain of the exact changes that may have taken place.

Biotechnologies such as genetic engineering are also forest management tools that could help address the conflicting demands for more wood from a resource whose accessibility is diminishing, as discussed in the Feature Articles section of this report. The productivity of certain types of forests, particularly those that are intensively managed or grown as plantations, could be improved by the use of trees that have been genetically enhanced for increased growth, or by the use of genetically-engineered, environmentally sound biological pest management products, such as the one described below.

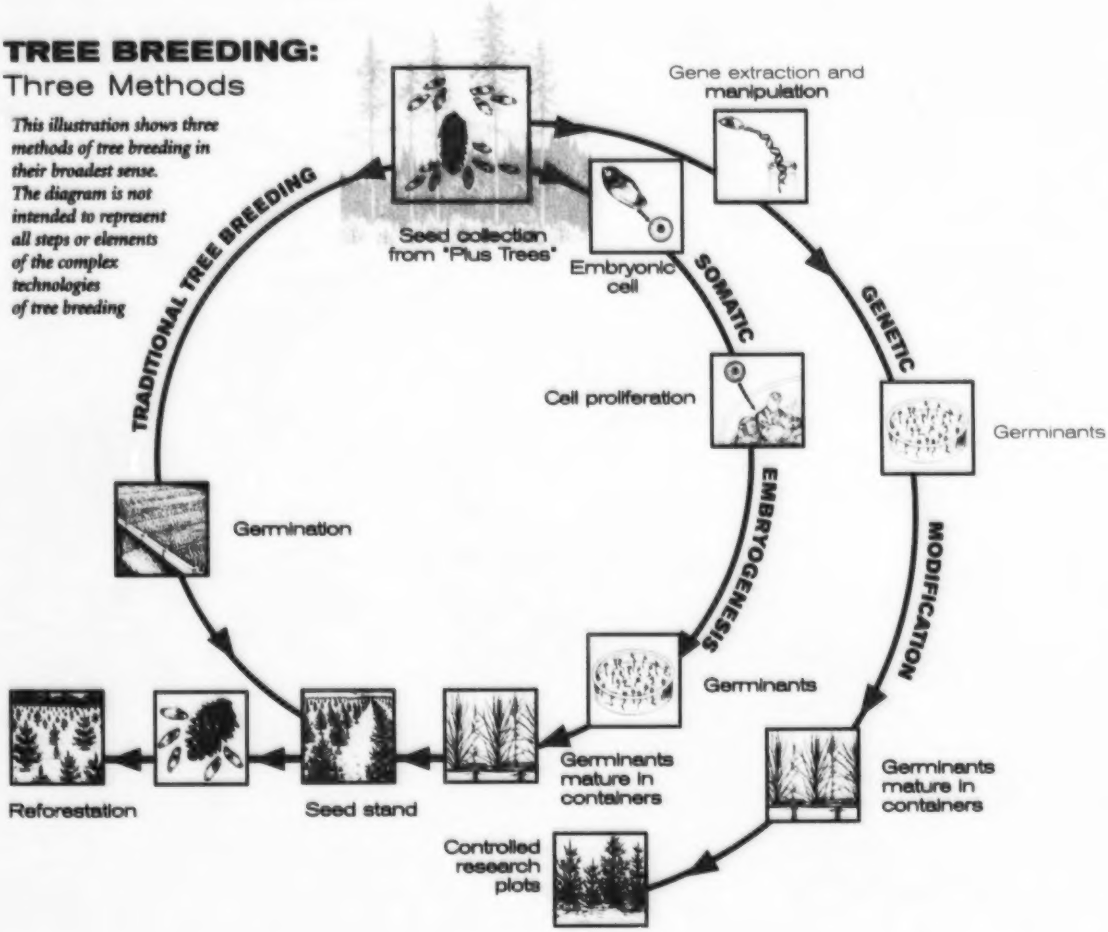
Baculoviruses are a group of host-specific viruses that occur naturally and that can be used as environmentally friendly biological pesticides. When a susceptible insect larvae, such as the spruce budworm, eats a specific baculovirus, the virus spreads within the insect causing the insect to become sick and eventually stop feeding. Ultimately, the insect dies from starvation. In the situation of the spruce budworm, naturally occurring baculoviruses take anywhere from 5 to 14 days to kill the insect, during which time the budworm larvae continue to eat large quantities of tree foliage. To make the baculovirus kill the budworm more quickly, a gene can be removed or added to the budworm-specific baculovirus. A baculovirus that has been changed by adding or removing a gene is called a genetically modified baculovirus. Genetically modified baculoviruses are not being used commercially in Canada. An initial field trial is being proposed and will consist of the release of a genetically-modified and tagged baculovirus to study its survival, persistence, and dispersal in a scientifically monitored, small-scale test.

Are genetically-modified trees being planted in Canada?

Genetically-modified trees are not being used for reforestation purposes in Canada.

Genetically-modified trees are subjected to an extensive series of laboratory tests before field-testing. The first trial of transgenic trees obtained regulatory approval in August 1997. This trial consists of a small, scientifically-monitored plot of poplar trees with a "marker gene". This marker gene acts as a "tag", allowing scientists to keep track of changes in the gene over time. Scientists will study the fate of the gene in this research trial for about 5 years, after which the trees will be cut down. Data collected during this confined field trial will be used to evaluate environmental safety and enhance scientific understanding of the performance of these experimental trees. Scientists are also working on mechanisms to "turn on" specific genes only when necessary. To reduce the chances of genes from genetically modified trees mixing with wild trees, researchers are identifying, studying and manipulating the genes that tell trees to produce cones and seeds. By ensuring that genetically modified trees are sterile—unable to reproduce—there will be minimal risk of these trees having any environmental impact.

At the policy level, it is a recognized role and priority for the federal government to ensure the safety of Canadians and their environment. Canada's Biotechnology Strategy was revamped in 1998 to ensure that the expanding field of biotechnology will continue to be appropriately regulated to respect Canadian safety requirements, values and interests. This new policy framework incorporates social, ethical, health, environmental and regulatory considerations.



TREE BREEDING:
Three Methods

This illustration shows three methods of tree breeding in their broadest sense. The diagram is not intended to represent all steps or elements of the complex technologies of tree breeding

Seed collection from "Plus Trees"
Gene extraction and manipulation
Embryonic cell
SOMATIC
GENETIC
TRADITIONAL TREE BREEDING
Cell proliferation
Germinants
Germination
EMBRYOGENESIS
MODIFICATION
Germinants
Germinants mature in containers
Germinants mature in containers
Reforestation
Seed stand
Controlled research plots

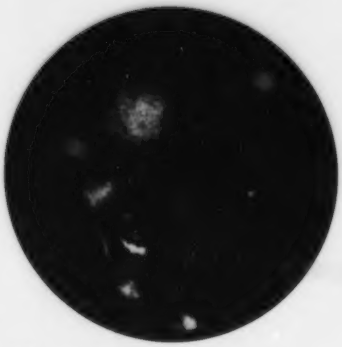
SPEAKING Øut

Visions of Canadian Youth

It has been said that today's society does not own the forest but rather it is an inherited resource to be passed on as a legacy to the next generation.

Given the theme of this year's *The State of Canada's Forests* report (Canada's Forests in the New Millennium), it is appropriate that the visions of today's youth be included. As the forest stewards of tomorrow, their views and visions offer many insights to the discussions.

The Canadian Forest Service solicited input from a number of youth, between the ages of 15 and 17 years, representing various urban and rural regions of Canada. These young people were invited to provide their personal vision for the future of Canada's forests. Those published in this report were selected based on the author's insight and comprehension of the myriad factors that affect decision-making within the forest sector, as well as their personal visions of, and expectations for, the future of the forest resource.



MARIE-HÉLÈNE BASQUE,
McWatters, Québec

Marie-Hélène Basque is a 17 year old cégep student in the Abitibi-Témiscamingue region of Québec. She is very involved in her community and is a member of the local Rouyn-Noranda 4H Club in which she participates in a number of environmental activities. After university, Marie-Hélène would like to either teach English or French to anglophones.

“As a native of Abitibi-Temiscamingue, Québec, I have always been surrounded by sweeping woodland vistas and immense forests. During many pleasant hikes to the peak of the mountain behind our home, my sister and I have gotten into the habit of naming every rock or pool of water that has a particular shape, as well as the trees we consider the most majestic. The favourite of the whole family is called "The Great Larch". This giant conifer dominates a rocky area where no other trees grow. Its beauty and strength inspired me at a very early age to appreciate the splendours of nature.

Too often, we regard the forest as a collection of tangled branches and leaves devoid of any particular interest. However, for many towns and villages in my region, for example, the forest industry is of vital importance and essential to the economy. A number of families depend on this industry for their livelihood. Unfortunately, today's society tends to take for granted this resource which is far from inexhaustible. Many household products are made from wood: from walls to tables, from fences to cheque books and cereal boxes, we are surrounded by such objects which are all derived from the same raw material. It is difficult to imagine life without all these everyday conveniences, but if steps are not taken to solve the current problems of forest management, the risk is real.

Clear-cutting is a sad reality, but this wasteful practice has given rise to a growing awareness in society, which is responding by implementing more and more effective methods aimed at attenuating this problem. I feel great sadness about the destructive methods being used that harm our forests, but I appreciate the considerable efforts that are being made to save them.

Another negative trend, over-exploitation, is sometimes taken to the point of completely stripping large areas of their trees. In such cases, better management of green spaces would be appropriate in places where it is currently neglected, since green spaces are essential to life, not just for humans but for animals and ecosystems in general. The quality of the environment also affects the purity of the air, and often even moral values. To this end, a number of activity days organized by the 4-H Club, to which I belong, such as the 24-hour forest survival experience, the Christmas tree pick-up day and many others, teach us about mutual assistance, sharing, community awareness, etc.

In my opinion, Canada has the richest and most magnificent forests in the world. They deserve to be wisely used, conserved and protected. A number of methods are already being used to this end, such as biotechnology, aimed at improving productivity and resistance to disease. Undoubtedly, we still have a long way to go to reach a balance and ideal management of the environment; however, we are on the right track.

Canada's forests conceal countless treasures: the enormous Douglas firs in British Columbia, the dense spruce forests of my native Abitibi region, and the harmonious blend of coniferous and deciduous trees of the Saguenay-Lac St-Jean area. All of these examples of natural splendour, which draw throngs of admiring tourists, have glorious pasts, an uncertain present overshadowed by concern about their ultimate fate, and unknown futures that will be determined by what we decide to do with them. Still, the main reason for my determination to conserve our natural heritage is a "Great Larch", perched on top of a mountain, which every spring offers me the magnificent spectacle of the opening of a thousand buds which resemble rose buds. And when my mother's days on earth are over, I hope that it will still be there so that her final wish can be fulfilled: that her ashes be scattered beneath its branches, which will then bear buds even more beautiful than those of roses.”

ALISON STACEY, Vernon, British Columbia

Alison Stacey, 17, lives in Vernon, British Columbia and attends Kalamalka Secondary School. She is a member of the Vernon Fish and Game Club and participates in competitive marksmanship. Alison says she recently completed a forest science course which stimulated her interest in forestry issues. After graduation, Alison plans to pursue a natural resources science degree which she hopes will enable her to work in forestry or with wildlife—fields in which she feels her contribution can make a real difference.

“Some people have said that Canada's forests are a valuable, yet dwindling resource. We need to establish a united perspective on how we want to care for Canada's forests, so that future generations of Canadians can enjoy them to the same extent as we do today.

As we are entering the new millennium, it is very important that we consider the future of Canada's forests, and the direction we want them to evolve in coming years, so that we may ensure both a healthy resource and continued economic prosperity for all. It is our responsibility to realize exactly how important our forests are to us, to determine what we perceive to be the major threats and to decide how we want to approach these various issues to produce the best possible results for everyone concerned.

To begin with, we need to consider just how important our forests are to us, in so many different ways. The forest sector alone directly employs a large number of people, and the economic value from production and sale of forest products is substantial. There are many people who spend a great deal of time outdoors, enjoying what our forests have to offer us during all times of the year. From hikers, campers and nature lovers, to hunters and fishermen, all sorts of people seek the quiet refuge our forests provide.

Every single day we all use wood products in one way or another—from the lumber that was used to build the houses that shelter us, to the paper we write on. The furniture we sit on and the tables we eat at are all derived from wood products. We depend on wood and it is an integral part of our way of life. We rely on our forests and without them, we would live a very different quality of life. Canada's forests are very important to all of us, and our futures are directly related to the future of our forests.

Together we have to decide what the major threats are and will be to our forests. Many people are concerned about the amount of logging that is being done, and whether or not our forests can be sustained if we continue at this rate for an extended period of time. We need to take a realistic look from all points of view, and ask ourselves what can be done to change the rate at which we are depleting our forest resources, while maintaining the forest industry at the same level it is now.

Pests are another major threat. Hopefully, in the future, we can find ways of controlling the beetle epidemics which periodically ravage our forests. These infestations often result in huge areas of timber being cleared in order to stop the spread of the beetles, as well as to salvage the remaining timber so it does not go to waste.

We also need to carefully consider how our timber harvest affects wildlife habitat and watersheds. Currently, large forest companies are doing a fair job in these areas of concern, as they comply with various rules and regulations. The long term plans are improving, as we have access to newer and better technology to help us project future statistics. Even so, we want to ensure that our current practices are not having a harmful effect on wildlife and other sensitive environmental factors. It is important to remember that it is not just timber harvesting that affects these animals, but the roads which are opened up, and which bring more and more traffic in to sensitive areas which may previously have been relatively undisturbed. Once we determine the threats to our forests, whether they are major or minor, we can prioritize and focus our attention on what needs to be dealt with first. We must work together to ensure that Canadians will be able to enjoy our forests for many years to come.

We need to entertain a united approach to decide how to best address the various issues concerning our forests, in order to maintain both recreational and economic use of Canada's forest resources. In relation to forest practices, we could look more closely at different methods of logging based on specific preharvest biogeoclimatic studies which would offer greater benefit to our forests, and perhaps give us more assurance we will be able to sustain our forests in the future. Another one of our biggest concerns is reforestation. Currently, we are replanting the areas that have been logged, but we need to make an increased effort, as this is the only way we will be able to maintain current harvesting levels. We could do more to help the young trees in early regeneration when they are most vulnerable, to ensure that we plant a new tree for every one we remove from our forests, and that it survives. Follow up studies and surveys are critical to ensure that tomorrow we will have as much as we have today. When we are considering the impact logging has on wildlife in the surrounding areas, it is not only the habitat change that must be taken into account. When a cut block is harvested, as was mentioned earlier, roads are built and consequently, a once relatively undisturbed area may be opened up to all sorts of traffic. This has an enormous impact. Road deactivation once the harvest and reforestation has been completed greatly reduces further disturbance of the area. In another area, we need to call for government funding, so that we can work to improve the studies on the various beetles that wreak havoc on our forests. If we could find a way to control pest infestations, and blend our harvesting practices with the natural cycles, we would benefit greatly. The more studies and research we do in areas such as this, the more we can protect our forests. Overall, if we can try to correct our past mistakes, and have the foresight to prevent future errors, then our forests will be that much better off.

We, the younger generation of Canadians, are concerned and want change. We are asking those who can overcome the problems facing our forests to think not only of the present, but of the future, thereby ensuring the sustainability of our forest resources. Together, we can preserve and protect Canada's forests, and assure ourselves and others that the future of our forests will be safe in our hands. Once we all understand how much our forests mean to us in our daily lives, and do everything possible to tackle whatever threatens our forests in an effective manner, then we will be on our way to giving future generations of Canadians the greatest gift of all—Canada's forests. ”

JAY POTTER, Dartmouth, Nova Scotia

Jay Potter is a 16 year old student of Prince Andrew High School in Dartmouth, Nova Scotia. He says he enjoys science very much but his true passion is English and creative writing. Jay harbors a goal of becoming the Secretary General of the United Nations as he says he cares about the world and society at large and wants to do his best to make Earth a better place for future generations to live.

“Ever since European settlers began to colonize Canada, forests have been an integral part of Canadians' lives. However, hundreds of years of harvesting Canada's vast woodlands has taken its toll, and if action is not taken the next generation of Canadians will not be able to enjoy the forests that we've come to take for granted. To prove the need for action, benefits of forests will be discussed along with the problems that face them. Also, some possible solutions to these problems will be given, in hopes that Canada will remain one of the most beautiful and prosperous countries on Earth in the 21st Century.

Forests provide many benefits to humanity. Firstly, forests play a critical role in maintaining balance in the Earth's atmosphere. Humans, as well as many animals, take in oxygen and release carbon dioxide, a greenhouse gas. Industry and automobiles also release these gases which can change the climate if not kept within reasonable levels. Trees however, take in carbon dioxide and release oxygen as a waste product, effectively keeping a balance on Earth. However, if forests are being continually removed, that balance will be destroyed and the environment will be in serious jeopardy.

Forests are also the habitat for countless animals, and destroying them can lead to animal populations becoming endangered or extinct. Loss of animal habitat has negative impacts on humans as well. For example, raccoons digging in trash cans or bears wandering into people's backyards. These incidents would not happen if forests were protected.

Another aspect of the forest which benefits humanity is their natural beauty. Many people use forests for recreational activities such as hiking, camping, skiing, and hunting. These activities can generate money as well, and ecotourism is an increasingly growing industry in Canada today.

Perhaps one of the most obvious benefits of forests is the lumber itself. Many families across Canada are dependent on the forest for their livelihood. Loggers cut down the trees, persons working at pulp mills help process the wood, other workers manufacture the wood into products, and some people earn a living simply transporting wood from one place to another. Forests have a great impact on our economy, and this benefit cannot be ignored.

Lastly, in order to see the benefits of forests one only has to look around the room they are standing in. Wood is so universally used it is virtually impossible to find a household or business which isn't using lumber for something. For these reasons and others, we must examine the problems facing Canada's forests and find ways of solving them.

There are currently several major threats to the survival of Canada's forests. The most obvious is clearcutting. While clearcutting is the most cheap and profitable method of harvesting trees, it is deadly to the environment. It takes at least twenty years for a clearcut forest to regenerate, and during that time all the wildlife in that area must find another habitat. Also, the soil is left in a very delicate state and is extremely prone to mudslides and erosion without the presence of trees.

Another major threat to forests is the continued use of dangerous herbicides to clear the forest floor, which can have negative side effects. For example, herbicides are absorbed by plants, and then animals eat these plants, causing the chemical to pass through the food chain. The further up the food chain the chemical goes, the amount of chemical in the organism increases as well. This proves that herbicides are not only a threat to plants, but to the entire ecosystem in which they are used.

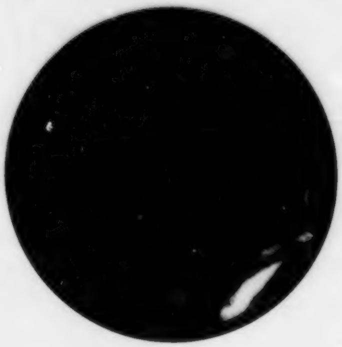
A further threat to Canadian forests is fire. While naturally occurring forest fires are actually beneficial to the forest, too many fires can decimate a forest. Fortunately, forest fires are easily preventable and if everyone used a little more common sense the forest fire rate would likely drop considerably.

Lastly, a major threat to Canadian forests is disease and parasites. If certain insects or diseases get out of control a forest can have little to no chance of survival. Take the case of the spruce budworm years ago. Spruce trees across Eastern Canada were decimated by this one parasite. This is an enemy we can fight with research, and instead of looking for deadlier pesticides, perhaps we should concentrate on remedies for these trees. While there are several threats to Canada's forests, working together we can overcome them and ensure a better forest for generations to come.

Because forests are so important to our lives, we must have a plan to protect them for the next century. While many groups argue to simply stop cutting, that would destroy the economy of many regions and is thus unfeasible. However, responsible woodlot management is not out of the question. Instead of clearcutting, use selection cutting, which leaves plenty of room for regeneration. While it may be more expensive, the forest will still be there the next year—unlike clearcutting. If you have to clear forested land, use thinning practices which do not involve chemicals in order to preserve the ecosystem. Saving the forests is mostly common sense. However, the best weapon we have to protect the forests is education. Educating people about responsible forestry practices will ensure that the land is well looked after and preserved for generations to come. As a youth, I know that our generation has some hard choices ahead of us, as it is often difficult to choose between conservation and industry. But the bottom line is there will be no industry without conservation, and that is the message that we must get across, or we may have a lot to regret in the future.

Forests play a critical role in our everyday lives. Considering they do so much for us, it is time to give back. Most of the things that threaten them come from us, humanity, and can be eliminated if we do not hesitate to act. There is a future in Canada's forests, but unless our attitudes change about forestry, our woodlands may just disappear forever.❞

KRYSTA NOSEWORTHY, Corner Brook, Newfoundland



Krysta Noseworthy, 17, currently attends Herdman Collegiate in Corner Brook, Newfoundland. Krysta states that she is very interested in the environment, especially forests, and that she viewed this opportunity as a good way to have her opinion heard. Krysta plans to attend Memorial University of Newfoundland in St. John's to study languages and art.

"Canada's forests are important. Of course, but why? There are the obvious reasons; we need trees and other plants to survive, they convert carbon dioxide into the oxygen we need to breathe. Also, wood is the most globally popular of all building supplies. Paper is extremely important for many reasons, one of which is that it is the most popular choice of writing material in Canada. Trees are needed for our health, our buildings, our books; they make up our scenery and physical landscape. With such a wealth of resources existing in just one feature, how can we harness this resource so that it will still be here in abundance for future generations? And how can we do this in the most profitable and environmentally friendly way?

Canadian forests need to be handled delicately, especially since it is not just us who are making use of them. Countries from all over the world make use of Canadian paper. So, obviously, we will need a large supply of it. The only way we will be able to continue producing the amount of paper is to replace everything we take. Every tree cut needs to have one planted in its place. And while it may seem tedious now, it's the only way to ensure the forest will still be there for our ancestors.

In addition to replanting trees, there are other ways that we can increase our paper supply without decreasing our forests. There are other ways to make paper. Used paper can be recycled through simple methods to form new, ready to use paper. Some people argue that recycled paper is not of the same quality as fresh paper. Perhaps this is a suggestion that new paper recycling methods need to be developed. Lower quality or not, recycled paper is a big help. Each sheet of paper you throw in the trash is like a branch of a tree that you're saying you don't need.

But there are other uses for trees besides paper and wood. They provide the necessary shelters for animals. Especially endangered species such as the Pine Marten. If our forests begin to disappear, these species are sure to follow. It's just another reason for us to give this issue our attention.

The current methods we use in our forests can be improved. I've seen forests, or rather lack thereof, all over Newfoundland. They're barren lands, covered only by tree stumps and layers of moss. Clear cutting is probably the worst method we could ever use. It takes

away the shelter young trees need. Forms of selective cutting, such as patch cutting, are much more effective in terms of replacing our forests.

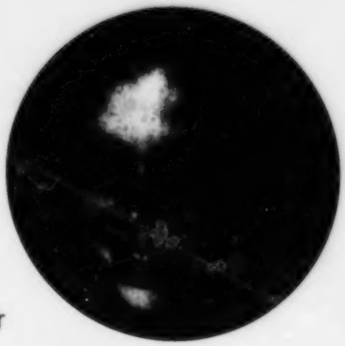
The largest threat to Canadian forests is our own laziness. Jobs such as replanting and selective cutting are tedious. But in refusing to replenish our forests we're acting much like a young child would, saying "I'll clean my room later". There is no later. While trees are a renewable resource, they are not a permanent one. If we abuse our forests to the point of extinction there is no getting them back. While a treeless Canada is hard to imagine and seems very far away, let's just think about it in smaller numbers.

We're destroying ourselves one forest at a time. If we cut down a forest and do not replace it, then come back in later years when we are in need of wood, it will be much more difficult than if we had used selective cutting. When we try to start a new forest on this now barren land, there is no shelter for the young trees. There is no healthy soil in which they can grow since there are no mature trees, which means there is no decaying plant material to form the nutritional layer of humus that helps the tree seedlings grow. There are no animals to spread the seeds around and increase the number of trees. Instead of a forest, we have a few seedlings that may be fortunate enough to reach adulthood. The land will need to go through succession all over again and that can take hundreds, even thousands, of years.

If we used more recycling techniques and exercised better use of paper and wood supplies, we would need less wood. Perhaps then we would not need so many machines to do the work for us. Less machines means more jobs, creating an all around healthier world and stronger economy. And that's something everyone can enjoy.

We need to treat our forests with care and respect. If we abuse them, they will not be there in the years to come. There is no way we can have a world without trees, we would simply cease to exist. The only way to guarantee our forests' continued success is to give care and attention to every detail—replacing everything we take, doing everything we can to aid the resource that does so much for us.”

IVA VUKIN, Mississauga, Ontario



Iva Vukin, 15, was born in Croatia and moved to Canada in 1988. She is a grade 10 student at Loyola Catholic Secondary School. Iva states that although her career goals are yet undefined, she is gearing herself towards the human sciences, perhaps biology or microbiology. Iva aspires to one day become the inventor of a miracle cure for cancer, AIDS, or another killer disease.

"Centuries ago, when our ancestors first stepped onto Canadian soil, they were faced with a vast, unmapped land offering a tremendous supply of forestlands. Their exploitation of these forests has become embedded in Canadian heritage and has given Canadians one of the highest standards of living in the world.

Although all of this natural wealth and prosperity has enriched our lives greatly, it has not been managed properly nor secured for future generations. In the past, harvesters of trees made hasty decisions fuelled by materialism, and did not think twice about the consequences of clearcutting massive regions of forest. A move to stop this rapid destruction was not enacted quickly enough and came only after considerable damage had been done. That is why Canadian citizens must take the initiative today to ensure the future of our forests for both economic and ecological purposes, so that we may continue to experience and benefit from all that they have to offer.

Canada's forests are public resources and the land and timber are owned by the people and managed by federal and provincial governments. Thus, I feel it is the right and responsibility of Canadian citizens to launch a campaign to spread awareness and organize action towards the collaborative management of forests. Sadly, many people are led to believe that since trees are a renewable resource, they cannot become scarce, and so the issue of conserving forests is kept on the backburner. As a result, too many Canadians do not fully understand the fragility of forests and the entire world of wildlife that abides in them. However, we must quickly begin to realize that we cannot take our abundance of forests for granted forever. The reality is, with modern technology and machinery, clear-cutting can completely deforest entire regions within several days. So the question is, do we let this go on and look forward to a future without the beauty and benefits of forest ecosystems, or do we bring a change to this exhausting system?

Hopefully, many people wish for change, as I do, and are ready to restructure their value of Canadian forests. It is true that forests provide a large chunk of economic prosperity and contribute approximately 17% of total exports, yet these are all perfunctory qualities when compared to the environmental side effects resulting from the destruction of our forests. It is easy to reduce or take apart a forest, and earn a few bucks, but it is virtually impossible to bring it back together again. Planting new trees does not replace an entire interdependent web of thousands of species of flora and fauna in their natural habitat. This is, unfortunately, a major misconception amongst the general public who feel that as long as foresters replant whatever they cut down, everything will be fine. Not to say that replanting is pointless, but merely ineffective in comparison to the rate of deforestation and the immediate disturbance of ecosystems. Thus, it is important for Canada to become further aware of the consequences to the environment and not allow ourselves to be misguided by corporations who claim that they are restoring forests.

Forests not only create a habitat for thousands of living organisms, they directly and indirectly support and benefit the quality of our lives. Fuelled by the energy of the sun, forests purify the air and water of pollutants, conserve water and soil, and regulate the climate. Without them, we could not experience the exhilaration of breathing fresh air or drinking crisp clean water. They also render nutritional supplements like fish, game, fungi, berries, and our world famous Canadian maple syrup. Forests provide recreational and spiritual getaways through unique opportunities like bird watching, hunting, camping, hiking, canoeing, photography, fishing, and relaxation. They are stress relievers for those of us in need of escape from the monotony of city life and everyday work. They give a sense of strength and security through their natural beauty, peace, and grandeur, and an opportunity to experience the essence of Canada. Thus, the provinces and territories should set aside more forested lands as parks and reserves so that current and future generations may enjoy the pleasure of forestlands.

Forests serve an extremely important role as reserves of scientific information because they consist of intricately woven relationships established between plant and animal life, and the natural surroundings. They are where Canadian wilderness blooms and personal encounters with nature are made. They offer unrivalled opportunities for environmental scientists to experience and study the nature of various plant and animal species, soils, water, and climate. Each living organism relies on the next, creating a natural harmony that invites wonder and appreciation of this phenomenon. Consequently, advances in scientific research can be made to benefit the environment, as well as employ many workers.

As Canadians embrace the millennium, we must take into consideration the importance and value of retaining the forests that span our country from east to west. We should look at this natural resource as a benefit and blessing from an ecological standpoint, rather than an economic one, so that we may do what is best for the environment. Efforts to improve the number and quality of forests should be a major priority in years to come. If current practices are allowed to continue, the environmental consequences will be devastating. Achieving these goals may be challenging at first, but, with time, patience, and effort, the rewards of having a beautiful landscape rich in healthy wildlife and opportunities for learning and exploration will be lasting. Let's work together at the dawn of the new century to keep forests a prominent part of the past, present, and future of Canadian culture. ”

GLOSSARY

Aboriginal Land
Lands within Aboriginal reserves or Aboriginal settlements.

Aboriginal Rights
Rights that some Aboriginal peoples of Canada hold as a result of their ancestors' long-standing use and occupancy of the land. The rights of certain Aboriginal peoples to hunt, trap and fish on ancestral lands are examples of Aboriginal rights. Aboriginal rights will vary from group to group depending on the customs, practices and traditions that have formed part of their distinctive cultures.

Afforestation
The establishment of a tree crop on an area from which it has always or very long been absent.

Age class
A distinct group of trees or portion of growing stock recognized on the basis of age.

Biodiversity
The total variability of life on Earth, including the diversity of genes, species and ecosystems.

Biosphere
That part of the earth and atmosphere capable of supporting living organisms.

Biotechnology
Development of products by a biological process. Production may be carried out by using intact organisms (e.g., yeasts and bacteria) or by using natural substances (e.g., enzymes) from organisms.

Boreal forest
One of 3 main forest zones in the world (see also tropical forest, temperate forest); it is located in northern regions and is characterized by the predominance of conifers.

Carbon dioxide (CO_2)
A colorless, odorless, non-combustible gas. Humans and all other living organisms give off carbon dioxide in respiration and decomposition. Trees and other plants absorb it and use it during photosynthesis. Also emitted as a by-product of burning fossil fuels.

Carbon sequestration
The uptake and storage of carbon. Trees and plants, for example, absorb carbon dioxide, release the oxygen and store the carbon. Fossil fuels were at one time biomass and continue to store the carbon until burned.

Certification (forest)
Forest certification is a market-based instrument aimed at promoting sustainable forest management that takes into account environmental, economic and social issues. It involves the independent assessment of forest management according to internationally (or nationally) accepted standards, and the tracking and monitoring of the supply of forest products to the marketplace. If the forest management is in compliance with a set of specified standards, and the timber from this forest has been tracked and accounted for through all stages of the production process, then it can be given a label which is recognized in the market place.

Clearcutting
A forest management method that involves the complete felling and removal of a stand of trees. Clearcutting may be done in blocks, strips, or patches.

Climate change
An alteration in measured quantities (e.g., precipitation, temperature, radiation, wind and cloudiness) within the climate system that departs significantly from previous average conditions and is seen to endure, bringing about corresponding changes in ecosystems and socioeconomic activity.

Cloning
In biotechnology, obtaining a group of genetically identical cells from a single cell; making identical copies of a gene.

Commercial forests
Forest land that is able to grow commercial timber within an acceptable time frame and is designated for such a purpose.

Crown lands
Public land that is managed by the national or provincial/territorial government.

Deforestation
Clearing an area of forest for another long-term use.

Ecoregion
A part of an ecozone characterized by distinctive regional ecological factors, including climate, physical geography, vegetation, soil, water, fauna and land use.

Ecosystem
A dynamic system of plants, animals and other organisms, together with the non-living components of the environment, functioning as an interdependent unit.

Ecotourism
A type of tourism that focuses on nature-related experiences (e.g., whale watching).

Emissions
Waste substances released into the air or water.

Engineered wood products
A composite wood product made from glued fibre, lumber and/or veneer to meet specific design criteria.

Forest plantation / Plantation forestry / Plantation forest
Forest stands established by planting and/or seeding in the process of afforestation or reforestation which are either of introduced species (all planted stands) or intensively managed stands of indigenous species, which meet all the following criteria: one or two species at plantation, even age class, regular spacing.

Fossil fuels
Oil, gas, coal and other fuels that were formed under the Earth's surface from the fossilized remains of plants and tiny animals that lived millions of years ago.

Fuelwood
Trees used for the production of firewood logs or other wood fuel.

Genetic Engineering
A process of inserting new genetic information into existing cells in order to modify a specific organism for the purpose of changing one of its characteristics.

Greenhouse effect
The warming of the Earth's atmosphere caused by increasing levels of carbon dioxide and other gases in the air, which trap the sun's heat within the atmosphere.

Greenhouse gases
Those gases, such as water vapor, carbon dioxide, tropospheric ozone, nitrous oxide, and methane, that are transparent to solar radiation but opaque to longwave radiation. Their action is similar to that of glass in a greenhouse. See also greenhouse effect.

Greenhouse gas sinks
Any process, activity or mechanism that removes greenhouse gases or their precursors from the atmosphere. The principal natural mechanism is photosynthesis.

Greenhouse gas source
Any process or activity (e.g., forest fires or conversion of forest land to agricultural or urban uses) that releases greenhouse gases or precursors of those gases into the atmosphere. As trees and forest products decompose or burn, they release carbon in the form of carbon dioxide.

Hardwood (trees)
Broad-leaved trees; also refers to the wood produced by these trees. Hardwoods belong to the botanical group angiospermae and are the dominant type of tree in the deciduous forest.

Non-timber forest products
Any commodity obtained from the forest that does not necessitate harvesting trees.

Non-timber forest values / Non-timber benefits / Non-timber resource values
Values within the forest other than timber which include but are not limited to biological diversity, fisheries, wildlife, minerals, water quality and quantity, recreation and tourism, cultural and heritage values, and wilderness and aesthetic values.

Old-growth forests
A forest dominated by mature trees that has not been significantly influenced by human activity. The stand may contain trees of different ages and various species of vegetation.

Protected areas
A geographically defined area which is designated or regulated and managed to achieve specific conservation objectives.

Reforestation
The reestablishment of trees on denuded forest land by natural or artificial means, such as planting and seeding.

Research and development (R&D)
Set of activities directed toward improving and innovating products and processes from a technological point of view and not from a commercial point of view. Encompasses basic research, applied research and development.

Riparian zone/Buffer zone/ Buffer strip
A strip of land maintained along a stream, lake, road, recreation site or different vegetative zone to mitigate the impacts of actions on adjacent lands, to enhance aesthetic values, or as a best management practice.

Rotation
The planned number of years between the formation or regeneration of a crop or stand and its final cutting at a specified stage or maturity.

Science and technology/S&T (forest)
Systematic activities that are closely concerned with the generation, advancement, dissemination and application of scientific and technical knowledge in all fields of science and technology, including such activities as research and development (R&D), scientific and technical education and training, and scientific and technological services.

Silviculture
The theory and practice of controlling the establishment, composition, growth and quality of forest stands. Can include basic silviculture (e.g., planting and seeding) and intensive silviculture (e.g., site rehabilitation, spacing and fertilization).

Softwood (trees)
Cone-bearing trees with needles or scale-like leaves; also refers to the wood produced by these trees. Softwoods belong to the botanical group gymnospermae and are the predominant tree type in coniferous forests.

Stand
A community of trees possessing sufficient uniformity in composition, age, arrangement, or condition to be distinguishable from the forest or other growth on adjoining areas, thus forming a silvicultural or management entity.

Stewardship
The science, art and skill of responsible and accountable management of resources.

Stumpage fee
The fee paid by an individual or company for the timber they harvest from public forests or privately owned forest land.

Sustainable forest management
Management that maintains and enhances the long-term health of forest ecosystems for the benefit of all living things while providing environmental, economic, social and cultural opportunities for present and future generations.

Temperate forest
One of 3 main forest zones in the world (see also boreal forest, tropical forest). The woodland of rather mild climatic areas; composed mainly of deciduous trees.

Tropical forest
One of 3 main forest zones in the world (see also boreal forest, temperate forest). A tropical woodland with an annual rainfall of a least 250 cm; marked by broadleaved evergreen trees forming a continuous canopy.

Value-added products / value-added production
Adding value to a product by further processing it. Examples of value-added wood products include joinery stock, windows, doors, kitchen cabinets, flooring and mouldings. Value-added pulp and paper products include such items as packaging, diapers, coated papers, tissue, business papers and stationery, and other consumer paper products.

Watershed
An area of land that is drained by underground or surface streams into another stream or waterway.

CONTACTS

The following organizations can provide more information about Canada's forest resources and its commitment to achieving sustainable forests.

National Forest Strategy Coalition

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Alberta Forest Products Association
200–11738 Kingsway Avenue
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Phone: (780) 452-2841
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E-mail: afpinfo@compusmart.ab.ca
Internet site: www.abforestprod.org

Alberta Registered Professional Foresters Association
5320–122 Street
Edmonton AB T6H 3S5
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E-mail: office@arpfa.org
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Association des biologistes du Québec
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E-mail: abq@qc.aira.com
Internet site: biosphere.ec.gc.ca/abq

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Association of Registered Professional Foresters of New Brunswick
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Association of University Forestry Schools of Canada
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Canadian Institute of Forestry
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Internet site: www.cif-ifc.org

Canadian Pulp and Paper Association
Édifice Sun Life
1155, rue Metcalfe, 19e étage
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Fax: (514) 866-3035
E-mail: communic@cppa.ca
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520 Sharpe Street
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Council of Forest Industries
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Government of Alberta
Department of Environment
Petroleum Plaza South Tower, 10th floor
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Internet site: www.gov.ab.ca

Government of British Columbia
Ministry of Forests
1450 Government Street, 1st floor
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Government of Manitoba
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Government of Nova Scotia
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Government of the Northwest Territories
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Government of the Yukon Territory
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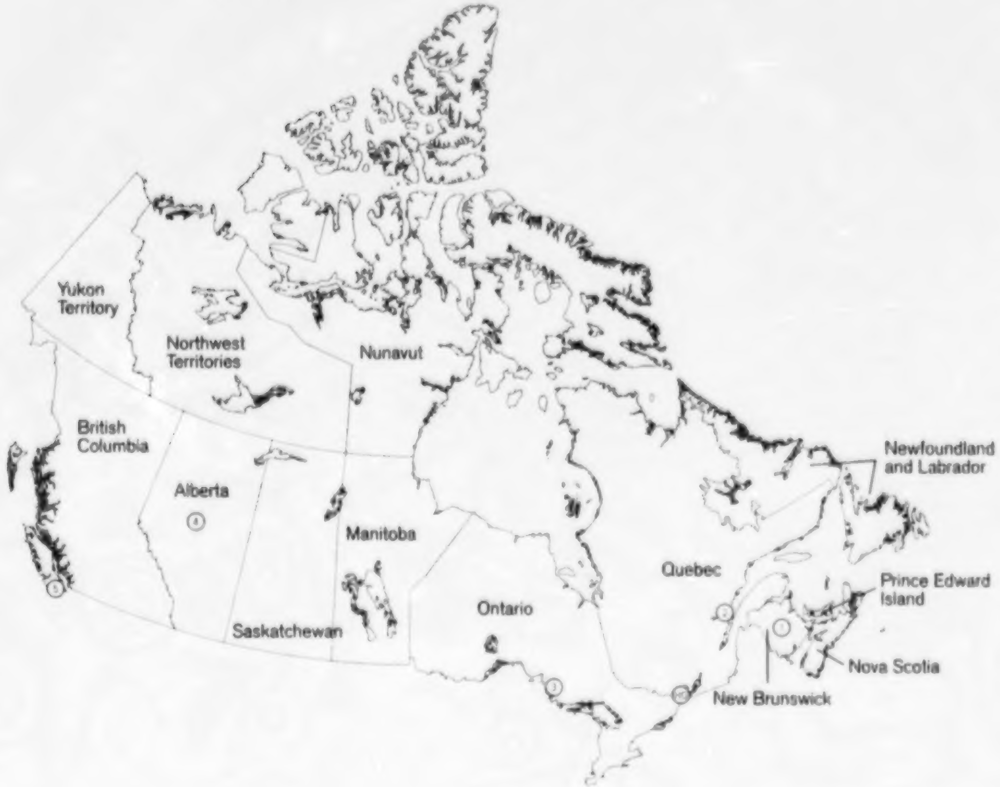

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